

G.1 Tools and Gauges

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G.1.1 Guide for Tools & Gauges List

The tools and gauges required for the RX maintenance work are classified as shown in the table below.

Class A includes tools and gauges essential to all RX versions.

Class B includes tools and gauges to be chosen depending upon the specifications of the purchased RXs.

Class C includes tools and gauges to be chosen depending upon the spinning conditions. In Class C-1, for example, tools and gauges should be chosen according to the ring inside diameter required for the spinning conditions.

Class D includes tools and gauges required if some unit is connected.

Tools & gauges classification table

Classification			Specifications and Remarks
Class		Variation	
A (Essential to all versions of the RXs)	—	—	—
B (To be chosen according to the specifications of the RXs)	1	—	4-spindle tape drive
	2	—	Electronic draft specification
	3	—	Compact specification
C (To be chosen according to the spinning conditions)	1 ※ ¹	—	According to the ring inside diameter
	2	—	According to the ring fit-in diameter
	3	—	According to the insert type
	4 ※ ¹	—	According to the spindle top part type
	5 ※ ¹	—	According to the bobbin type
	6	—	According to the bobbin check gauge
	7 ※ ¹	—	According to the balloon control ring
	8	—	According to the spindle brake type
D (According to the connected units)	1	—	For SCD, TBC (Refer to the SCD Instructions Manual.)
	2	—	For blow cleaner
	3	—	For pneumatic motor rated at 5.5 kW or more

*1 In the tools & gauges lists given on the subsequent pages, the quantity column is divided according to the number of RXs installed.

G.1.2 Tools & Gauges List

In the tools & gauges lists given below, the class of use is indicated by one of three letters, A, I, and M; the degree of necessity is indicated by one of three letters, E, R, and C.

I : Required for Installation only

A : Required for both installation And maintenance

M : Required for Maintenance only

[1] Class A: Tools & Gauges Essential to All Versions

No.	Part Number	Description	Q'ty		Class of use	Specifications
			1-20	21-		
1	R8203-16010-**	GAUGE-ASSY, SPINDLE RAIL STRAIGHT	2	2	I	
2	R8203-18010-**	GAUGE, SPINDLE RAIL STRAIGHT	1	1	I	
3	R8203-11010-**	TOOL-ASSY, MACHINE CENTER POSITIONING	2	2	I	
4-1	77105-00001	WRENCH, TORQUE	2	2	I	For both Roller Stand and Line Shaft Coupling
4-2	77104-13003	SOCKET, ROLLER STAND WRENCH	2	2	I	For Roller Stand
4-3	77105-00021-00	SOCKET, HEXAGON (5)	1	1	I	For Line Shaft Coupling
5	77133-00008	TRANSIT	1	1	I	
6	77101-24002	SPANNER, DOUBLE END	2	2	I	For Spring Piece Foot (24 × 30)
7-1	R8209-01012-**	GAUGE-ASSY, LIFTING UPPER BKT. POS. RH	1	1	I	70 G
7-2	R8209-01032-**	GAUGE-ASSY, LIFTING UPPER BKT. POS. RH	1	1	I	75 G
8-1	R8209-01022-**	GAUGE-ASSY, LIFTING UPPER BKT. POS. LH	1	1	I	70 G
8-2	R8209-01042-**	GAUGE-ASSY, LIFTING UPPER BKT. POS. LH	1	1	I	75 G
9	R8203-31010-**	TOOL-COMPL, SPINDLE RAIL POSITIONING	4	4	I	
10	R8277-00011-**	TOOL, LIFTING SHAFT	1	1	I	
11	R8285-01010-**	ROD, OE HEAD CENTERING (INSIDE)	2	2	I	
12	R8251-01020-**	GAUGE-COMPL, HEIGHT	2	2	A	
13-1	77135-00009	TOOL, TIGHTENING FOR BOTTOM ROLLER	1	1	A	Roller Dia. 27
13-2	77135-00010	TOOL, TIGHTENING FOR BOTTOM ROLLER	1	1	A	Roller Dia. 28.5
14-1	77135-00031-**	WRENCH, ROLLER FOR TORQUE (27)	1	1	A	Roller Dia. 27
14-2	77135-00032-**	WRENCH, ROLLER FOR TORQUE (28.5)	1	1	A	Roller Dia. 28.5
15	R8257-50010-**	JOINT-COMPL, TORQUE WRENCH	1	1	A	

No.	Part Number	Description	Q'ty		Class of use	Specifications
			1-20	21-		
16	77105-00026-**	WRENCH, TORQUE (90N)	1	1	A	
17	R3101-01302-**	PILLAR, CREEL (L=522)	1	1	A	
18	R8257-01020-**	TOOL, STRAIGHTENING FOR BOTTOM ROLLER	1	1	A	
19-1	R8232-11022-**	GAUGE, BACKLASH	1	1	A	Pinion Gear 31T*
19-2	R8232-11030-**	GAUGE, BACKLASH	1	1	A	Pinion Gear 34T*
20-1	R8259-11010-**	TOOL, WEIGHTING ARM	2	2	A	For TexParts Arm, TOYOTA-made α100
20-2	R8259-01020-**	TOOL, WEIGHTING ARM	2	2	A	TexParts PK2130
20-3	R8259-01030-**	TOOL, WEIGHTING ARM	2	2	A	TexParts PK2630
21	77104-19004	WRENCH, L-SHAPED BOX	1	1	A	Subtense distance:19 mm
22	77133-00007-**	LEVEL (150 mm)	2	2	A	
23	76201-00009	GAUGE, DIAL WITH MAGNET BASE	1	1	A	
24	R8247-01010-**	GAUGE, DIAL POINT	1	1	A	
25	R8217-01010-**	TOOL-ASSY, RING LOCKING SPRING	1	1	A	
26	77102-35001	WRENCH, SINGLE OPEN-END (35)	1	1	A	Subtense distance:35 mm (For Gear Replacement)
27	77112-03002	WRENCH, HEXAGONAL (3)	2	2	A	
28	R8232-01010-**	TOOL-ASSY, GEAR CHANGE	2	2	A	
29	R0512-71030-**	HANDLE, LIFTING	2	4	A	
30	77135-00026-**	TOOL, BELT TENSION	1	1	A	
31	77135-00027-**	SENSOR, BELT TENSION	1	1	A	
32	R8203-55010-**	TOOL, BEARING POSITION	2	2	A	
33	R8207-21010-**	TOOL-COMPL, MAIN MOTOR POSITION	2	2	A	
34	77140-00007	PUMP, GREASE	1	1	M	
35	77140-00008	NOZZLE, GREASE PUMP	1	1	M	
36	68601-00001	BAND,CV-250A	100	100	A	

*: Unnecessary for electronic draft specification

[2] Class B: Tools & Gauges to be Chosen According to the Specifications

■ B-1. 4-spindle tape drive

No.	Parts Number	Name	Quantity		Class of use	Specifications
			1-20	21-		
1-1	R8206-01011-**	GAUGE, TIN PULLEY POSITIONING (Z)	1	1	I	For Z twist. (70 G and 75 G) Wharve dia.: 18.5, 20.2
1-2	R8206-01020-**	GAUGE, TIN PULLEY POSITIONING (Z)	1	1	I	For Z twist. (70 G and 75 G) Wharve dia.: 23.8
1-3	R8206-31011-**	GAUGE-COMPL, TIN PULLEY POSITIONING (SZ)	1	1	I	For S/Z twist. Wharve dia.: 18.5, 20.2
1-4	R8206-31020-**	GAUGE-COMPL, TIN PULLEY POSITIONING (SZ)	1	1	I	For S/Z twist. Wharve dia.: 23.8
2-1	R8206-11011-**	GAUGE-ASSY, JOCKEY BRACKET COLLAR POS.	1	1	I	For Z twist. (70 G and 75 G)
2-2	R8206-41012-**	GAUGE, TAPE TENSION LEVER (70 G)	1	1	I	For S/Z twist. (70 G)
2-3	R8206-41022-**	GAUGE, TAPE TENSION LEVER (75 G)	1	1	I	For S/Z twist. (75 G)
3	77112-04003	WRENCH, HEXAGON FOR TIN PULLEY	1	1	I	
4	R8203-35011-**	TOOL, PIECE VERTICAL	2	2	I	
5	R8204-01010-**	GAUGE-ASSY, ROLLER STAND POS.	1	1	I	
6-1	R8279-51010-**	TOOL, LAPPET POSITIONING 70 G	2	2	I	70 G
6-2	R8279-51030-**	TOOL, LAPPET POSITIONING 75 G	2	2	I	75 G
6-3	R8279-51020-**	TOOL, LAPPET POSITIONING 70 G	2	2	I	70 G
6-4	R8279-51040-**	TOOL, LAPPET POSITIONING 75 G	2	2	I	75 G
7	R8208-01030-**	WRENCH-COMPL, BOX (32)	2	2	A	Subtense distance: 32 mm
8	77102-46001	WRENCH, SINGLE OPEN-END (46)	2	2	A	
9-1	R8236-01010-**	TOOL, SPINDLE DRIVE BELT PRESSURE WELDING	1	1	M	Tape TS5, USA plug, 120 V
9-2	R8236-01020-**	TOOL, SPINDLE DRIVE BELT PRESSURE WELDING	1	1	M	Tape TS5, EURO plug, 230 V
9-3	R8236-02010-**	TOOL, SPINDLE DRIVE BELT PRESSURE WELDING	1	1	M	Tape W8, USA plug, 120 V
9-4	R8236-02020-**	TOOL, SPINDLE DRIVE BELT PRESSURE WELDING	1	1	M	Tape W8, EURO plug, 230 V
10	R8236-12010-**	TOOL, COOLING CLAMP	1	1	M	Exclusive to tape W8
11-1	R8236-22040-**	TOOL, GUIDE RAIL (W=11)	1	1	M	Exclusive to tape W8, 11-mm wide
11-2	R8236-22060-**	TOOL, GUIDE RAIL (W=13)	1	1	M	Exclusive to tape W8, 13-mm wide

■ B-2. Choice according to the electronic draft specification

No.	Parts Number	Name	Quantity		Class of use	Specifications
			1-20	21-		
1	71106-08001-**	BOLT, REAMER M8	2	2	A	Indispensable to electronic draft specification
2	R8203-37010-**	BLOCK, BELT TENSION E-DRAFT	2	2	A	Indispensable to electronic draft specification

■ B-3. Choice according to the compact specification

No.	Parts Number	Name	Quantity		Class of use	Specifications
			1-20	20-		
1	R8291-010*0-**	TOOL-ASSY, CARRIER GEAR POSITIONING	2	2	I	Indispensable to compact specification
2	R8291-11010-**	TOOL, ROLLER STAND POSITIONING	2	2	I	Indispensable to compact specification
3	R8291-21020-**	HOOP, CHECK DELIVERY	2	2	I	Indispensable to compact specification
4	R8291-22010-**	HOOP, CHECK FRONT	2	2	I	Indispensable to compact specification
5	R8291-31010-**	RING, CARRIER GEAR POSITIONING	4	4	I	Indispensable to compact specification
6	R8291-41010-**	CLAMP-ASSY, POSITIONING	2	2	I	Indispensable to compact specification
7	R8297-01010-**	TOOL, COMPL, TRUMPET	2	2	A	Indispensable to compact specification
8	R8294-01010-**	GAUGE-ASSY, MANOMETER COMPACT	1	1	A	Indispensable to compact specification

[3] Class C: Tools & Gauges to be Chosen According to the Spinning Conditions

■ C-1. Choice according to the ring inside diameter

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
1-1	R8203-43010-**	RING-ASSY, SPINDLE CENTERING (36)	2	4	4	4	A	Ring dia. : ø36
1-2	R8203-43020-**	RING-ASSY, SPINDLE CENTERING (38)	2	4	4	4	A	Ring dia. : ø38
1-3	R8203-43110-**	RING-ASSY, SPINDLE CENTERING (39)	2	4	4	4	A	Ring dia. : ø39
1-4	R8203-43120-**	RING-ASSY, SPINDLE CENTERING (40)	2	4	4	4	A	Ring dia. : ø40
1-5	R8203-43030-**	RING-ASSY, SPINDLE CENTERING (41)	2	4	4	4	A	Ring dia. : ø41
1-6	R8203-43100-**	RING-ASSY, SPINDLE CENTERING (42)	2	4	4	4	A	Ring dia. : ø42
1-7	R8203-43040-**	RING-ASSY, SPINDLE CENTERING (44)	2	4	4	4	A	Ring dia. : ø44
1-8	R8203-43050-**	RING-ASSY, SPINDLE CENTERING (45)	2	4	4	4	A	Ring dia. : ø45

G.1.2 Tools & Gauges List

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
1-9	R8203-43060-**	RING-ASSY, SPINDLE CENTERING (46)	2	4	4	4	A	Ring dia. : $\phi 46$
1-10	R8203-43070-**	RING-ASSY, SPINDLE CENTERING (47)	2	4	4	4	A	Ring dia. : $\phi 47$
1-11	R8203-43080-**	RING-ASSY, SPINDLE CENTERING (48)	2	4	4	4	A	Ring dia. : $\phi 48$
1-12	R8203-43090-**	RING-ASSY, SPINDLE CENTERING (50)	2	4	4	4	A	Ring dia. : $\phi 50$
1-13	R8203-43130-**	RING-ASSY, SPINDLE CENTERING (51)	2	4	4	4	A	Ring dia. : $\phi 51$
1-14	R8203-43140-**	RING-ASSY, SPINDLE CENTERING (52)	2	4	4	4	A	Ring dia. : $\phi 52$
1-15	R8203-43150-**	RING-ASSY, SPINDLE CENTERING (53)	2	4	4	4	A	Ring dia. : $\phi 53$
2-1	R8237-01012-**	RING-ASSY, TRAVELLER CLEARER (36)	1	2	2	2	A	$\phi 36 \times 3.2$ 、 3.35
2-2	R8237-01022-**	RING-ASSY, TRAVELLER CLEARER (38)	1	2	2	2	A	$\phi 38 \times 3.2$ 、 3.35
2-3	R8237-01132-**	RING-ASSY, TRAVELLER CLEARER (39)	1	2	2	2	A	$\phi 39 \times 3.2$ 、 3.35
2-4	R8237-01142-**	RING-ASSY, TRAVELLER CLEARER (40)	1	2	2	2	A	$\phi 40 \times 3.2$ 、 3.35
2-5	R8237-01032-**	RING-ASSY, TRAVELLER CLEARER (41)	1	2	2	2	A	$\phi 41 \times 3.2$ 、 3.35
2-6	R8237-01122-**	RING-ASSY, TRAVELLER CLEARER (42)	1	2	2	2	A	$\phi 42 \times 3.2$ 、 3.35
2-7	R8237-01040-**	RING-ASSY, TRAVELLER CLEARER (44)	1	2	2	2	A	$\phi 44 \times 3.2$ 、 3.35
2-8	R8237-01050-**	RING-ASSY, TRAVELLER CLEARER (45)	1	2	2	2	A	$\phi 45 \times 3.2$ 、 3.35
2-9	R8237-01060-**	RING-ASSY, TRAVELLER CLEARER (46)	1	2	2	2	A	$\phi 46 \times 3.2$ 、 3.35
2-10	R8237-01070-**	RING-ASSY, TRAVELLER CLEARER (47)	1	2	2	2	A	$\phi 47 \times 3.2$ 、 3.35
2-11	R8237-01080-**	RING-ASSY, TRAVELLER CLEARER (48)	1	2	2	2	A	$\phi 48 \times 3.2$ 、 3.35
2-12	R8237-01100-**	RING-ASSY, TRAVELLER CLEARER (50)	1	2	2	2	A	$\phi 50 \times 3.2$ 、 3.35
2-13	R8237-01150-**	RING-ASSY, TRAVELLER CLEARER (51)	1	2	2	2	A	$\phi 51 \times 3.2$ 、 3.35
2-14	R8237-01190-**	RING-ASSY, TRAVELLER CLEARER (35)	1	2	2	2	A	$\phi 35 \times 3.2$ 、 3.35
2-15	R8237-01180-**	RING-ASSY, TRAVELLER CLEARER (34)	1	2	2	2	A	$\phi 34 \times 3.2$ 、 3.35
2-16	R8237-01212-**	RING-ASSY, TRAVELLER CLEARER (41)	1	2	2	2	A	$\phi 41 \times 4.0$
2-17	R8237-01222-**	RING-ASSY, TRAVELLER CLEARER (42)	1	2	2	2	A	$\phi 42 \times 4.0$

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
2-18	R8237-01232-**	RING-ASSY, TRAVELLER CLEARER (43)	1	2	2	2	A	ø43 × 4.0
2-19	R8237-01242-**	RING-ASSY, TRAVELLER CLEARER (44)	1	2	2	2	A	ø44 × 4.0
2-20	R8237-01252-**	RING-ASSY, TRAVELLER CLEARER (45)	1	2	2	2	A	ø45 × 4.0
2-21	R8237-01262-**	RING-ASSY, TRAVELLER CLEARER (46)	1	2	2	2	A	ø46 × 4.0
2-22	R8237-01272-**	RING-ASSY, TRAVELLER CLEARER (47)	1	2	2	2	A	ø47 × 4.0
2-23	R8237-01282-**	RING-ASSY, TRAVELLER CLEARER (48)	1	2	2	2	A	ø48 × 4.0
2-24	R8237-01292-**	RING-ASSY, TRAVELLER CLEARER (49)	1	2	2	2	A	ø49 × 4.0
2-25	R8237-01302-**	RING-ASSY, TRAVELLER CLEARER (50)	1	2	2	2	A	ø50 × 4.0
2-26	R8237-01312-**	RING-ASSY, TRAVELLER CLEARER (51)	1	2	2	2	A	ø51 × 4.0
2-27	R8237-01322-**	RING-ASSY, TRAVELLER CLEARER (52)	1	2	2	2	A	ø52 × 4.0
2-28	R8237-01332-**	RING-ASSY, TRAVELLER CLEARER (53)	1	2	2	2	A	ø53 × 4.0

■ C-2. Choice according to the ring fit-in diameter

No.	Parts Number	Name	Quantity		Class of use	Specifications
			1-20	21-		
1-2	R8205-01070-**	TOOL-ASSY, RING PLATE POSITIONING	2	2	A	Ring fit-in dia. : ø50.8
1-3	R8205-01080-**	TOOL-ASSY, RING PLATE POSITIONING	2	2	A	Ring fit-in dia. : ø54
1-4	R8205-01090-**	TOOL-ASSY, RING PLATE POSITIONING	2	2	A	Ring fit-in dia. : ø57.5
2-2	R8205-11070-**	TOOL-ASSY, RING PLATE POSITIONING	1	1	A	Ring fit-in dia. : ø50.8
2-3	R8205-11080-**	TOOL-ASSY, RING PLATE POSITIONING	1	1	A	Ring fit-in dia. : ø54
2-4	R8205-11090-**	TOOL-ASSY, RING PLATE POSITIONING	1	1	A	Ring fit-in dia. : ø57.5

■ C-3. Choice according to the spindle insert type

No.	Parts Number	Name	Quantity			Class of use	Specifications
			1-2	3-20	21-		
1-1	R8253-01031-**	GAUGE, SPINDLE OIL LEVEL HP-S68	1	1	1	A	HP-S68/HP-S68 (NASA)
1-2	R8253-01052-**	GAUGE, SPINDLE OIL LEVEL CS1,CS1-S	1	1	1	A	CS1, CS1-S
1-3	R8253-01062-**	GAUGE, SPINDLE OIL LEVEL CS1-12,CS21-12	1	1	1	A	CS1-12, CS21-12
2-1	R8253-21090-**	TANK, LUBRICATION APPARATUS (1 × 220 V)	1	1	1	A	TexParts oil changer (electric)
2-2	R8253-21100-**	TANK, LUBRICATION APPARATUS (1 × 110 V)	1	1	1	A	TexParts oil changer (electric)
2-3	R8253-21110-**	TANK, LUBRICATION APPARATUS (3 × 380 V)	1	1	1	A	TexParts oil changer (electric)
2-4	R8253-21120-**	TANK, LUBRICATION APPARATUS (3 × 220 V)	1	1	1	A	TexParts oil changer (electric)
3-1	R8253-31010-**	NOZZLE, LUBRICATION CS1	1	1	1	A	TexParts oil change nozzle
3-2	R8253-31020-**	NOZZLE, LUBRICATION CS1-12	1	1	1	A	TexParts oil change nozzle
3-3	R8253-31230-**	NOZZLE, LUBRICATION CS21-12 HOOK	1	1	1	A	TexParts oil change nozzle
3-4	R8253-31090-**	NOZZLE, LUBRICATION CS1 HOOK	1	1	1	A	TexParts oil change nozzle
3-5	R8253-31160-**	NOZZLE, LUBRICATION CS1	1	1	1	A	NOVIBRA oil change nozzle

■ C-4. Choice according to the spindle top part type

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
1-1	R8235-01030-**	TOOL-ASSY, SNAIL WIRE CENTERING	1	2	4	4	A	6-inch
1-2	R8235-01040-**	TOOL-ASSY, SNAIL WIRE CENTERING	1	2	4	4	A	7-inch
1-3	R8235-01051-**	TOOL-ASSY, SNAIL WIRE CENTERING	1	2	4	4	A	8-inch

■ C-5. Choice according to the bobbin type

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
1-1	R8203-41040-***	SLEEVE, SPINDLE CENTERING (6-INCH)	2	4	4	4	A	6-inch button-chip, w/ cutter
1-2	R8203-41050-***	SLEEVE, SPINDLE CENTERING (7-INCH)	2	4	4	4	A	7-inch button-chip, w/ cutter
1-3	R8203-41030-***	SLEEVE, SPINDLE CENTERING (8-INCH)	2	4	4	4	A	8-inch button-chip, w/ cutter

■ C-6. Choice according to the bobbin check gauge

No.	Parts Number	Name	Quantity		Class of use	Specifications
			1-20	21-		
1-1	R8239-01010-**	GAUGE, BOBBIN CHECK (6-INCH)	1	1	A	6-inch button-chip, w/ cutter
1-2	R8239-01020-**	GAUGE, BOBBIN CHECK (7-INCH)	1	1	A	7-inch button-chip, w/ cutter
1-3	R8239-01040-**	GAUGE, BOBBIN CHECK (8-INCH)	1	1	A	8-inch button-chip, w/ cutter

■ C-7. Choice according to the balloon control ring

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
1-1	R8205-51010-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø42, Bobbin length: 7 in
1-2	R8205-51020-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø44, Bobbin length: 7 in
1-3	R8205-51030-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø44.5, Bobbin length: 7 in
1-4	R8205-51040-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø45, Bobbin length: 7 in
1-5	R8205-51050-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø46, Bobbin length: 7 in
1-6	R8205-51060-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø47, Bobbin length: 7 in
1-7	R8205-51070-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø47.6, Bobbin length: 7 in
1-8	R8205-51080-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø48, Bobbin length: 7 in
1-9	R8205-51090-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø49, Bobbin length: 7 in
1-10	R8205-51100-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø51, Bobbin length: 7 in
1-11	R8205-51110-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø52.5, Bobbin length: 7 in

G.1.2 Tools & Gauges List

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
1-12	R8205-51120-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø54, Bobbin length: 7 in
1-13	R8205-52010-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø42, Bobbin length: 7 in
1-14	R8205-52020-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø44, Bobbin length: 7 in
1-15	R8205-52030-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø44.5, Bobbin length: 7 in
1-16	R8205-52040-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø45, Bobbin length: 7 in
1-17	R8205-52050-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø46, Bobbin length: 7 in
1-18	R8205-52060-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø47, Bobbin length: 7 in
1-19	R8205-52070-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø47.6, Bobbin length: 7 in
1-20	R8205-52080-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø48, Bobbin length: 7 in
1-21	R8205-52090-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø49, Bobbin length: 7 in
1-22	R8205-52100-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø51, Bobbin length: 7 in
1-23	R8205-53060-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø52.5, Bobbin length: 7 in
1-24	R8205-52120-**	GAUGE, BAL-CON RING CENTERING	1	2	4	4	A	Bal-con dia.: ø54, Bobbin length: 7 in
1-36	R8205-61010-**	BOBBIN, BAL-CON RING CENTERING	1	2	4	4	A	7 in
1-37	R8205-61020-**	BOBBIN, BAL-CON RING CENTERING	1	2	4	4	A	8 in

■ C-8. Choice according to the spindle brake

No.	Parts Number	Name	Quantity				Class of use	Specifications
			1-2	3-20		21-		
				-576 sp	- 1824 sp			
1	R8217-11010-***	TOOL ASSY, BOLSTER	2	4	4	4	A	Finger brake

[4] Class D: Tools & Gauges to be Chosen According to the Connected Units

■ D-1. For blow cleaner

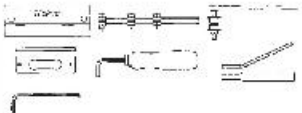
No.	Parts Number	Name	Quantity		Class of use	Specifications
			1-20	21-		
1	R8273-01010-**	TOOL-ASSY, BELT TENSION LUWA	1	1	A	If a blow cleaner is connected.

■ D-2. For maintaining pneumatic motor

No.	Parts Number	Name	Quantity		Class of use	Specifications
			1-20	21-		
1	R8288-01000-**	ROLLER-ASSY, CHAIN BLOCK	1	1	M	For maintaining motors rated at 5.5 kW or more.

G.1.3 Illustrations of Tools and Gauges

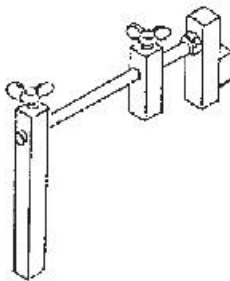
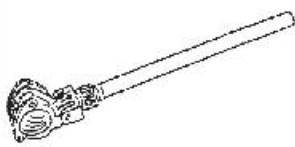
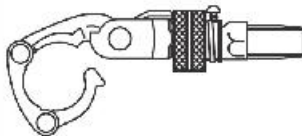
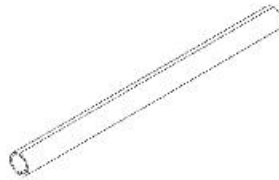
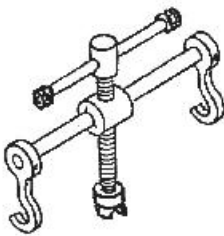
■ Guide for the illustrations

R8259-01020-**
TOOL, WEIGHTING ARM

SKF PK1500/1601 For Arm

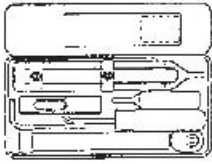
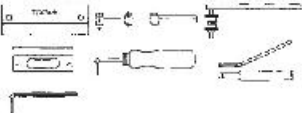
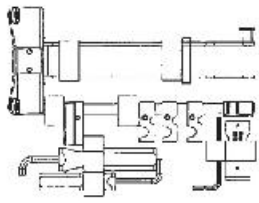
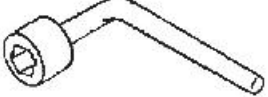
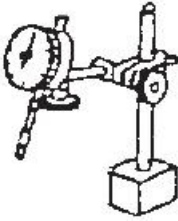
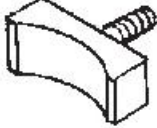
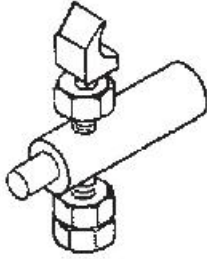
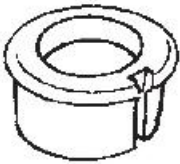
- ① Parts code
- ② Parts name
- ③ Illustration
- ④ Specifications and models

[1] For Installation and Maintenance

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

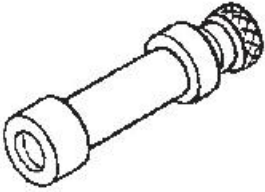
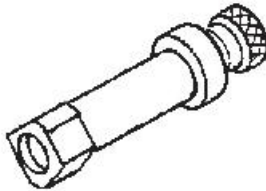
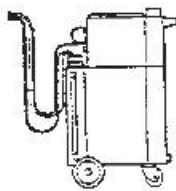
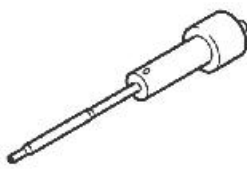
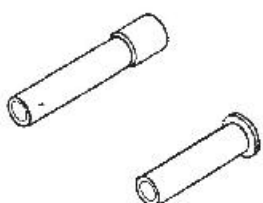
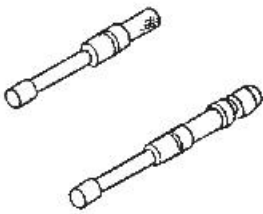
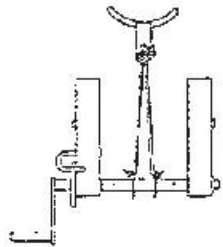
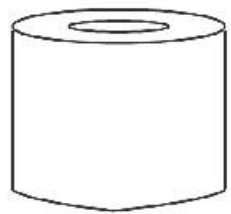
R8251-01020-**	77135-000**	77135-0003*-**	R8257-50010-**
GAUGE-COMPL, HEIGHT	TOOL, TIGHTENING FOR BOTTOM ROLLER	WRENCH, ROLLER FOR TORQUE	JOINT-COMPL, TORQUE WRENCH
			
77105-00026-**	R3101-01302-**	R8257-01020-**	R8232-110**
WRENCH, TORQUE (90N)	PILLAR, CREEL (L=522)	TOOL, STRAIGHTENING FOR BOTTOM ROLLER	GAUGE, BACKLASH
			

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

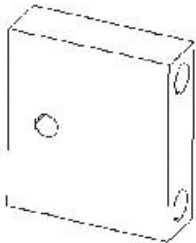
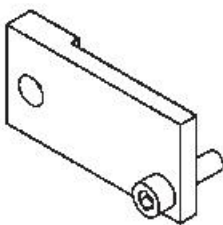
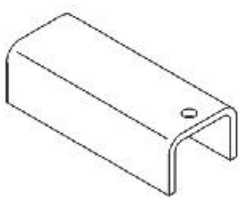
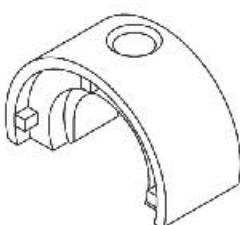
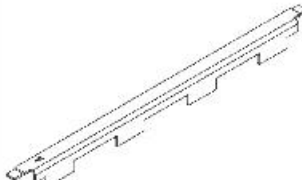
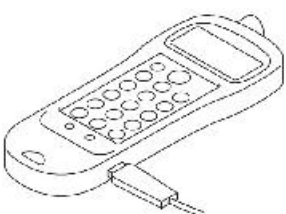
R8259-11010-** TOOL, WEIGHTING ARM  For TOYOTA a100, TexParts PK2025 arm	R8259-01020-** TOOL, WEIGHTING ARM  For SKF PK1500/1601 arm	R8259-01031-** TOOL, WEIGHTING ARM  For SKF PK2630 arm	77104-19004 WRENCH, L-SHAPED BOX  Subtense distance: 19 mm
77133-00007-** LEVEL (150 mm)  150 mm	76201-00009 GAUGE, DIAL WITH MAGNET BASE 	R8247-01010-** GAUGE, DIAL POINT 	R8217-01010-** TOOL-ASSY, RING LOCKING SPRING 
77102-35001 WRENCH, SINGLE OPEN-END (35)  Subtense distance: 35 mm (for gear change)	77112-03002 WRENCH, HEXAGON (3) 	R8232-01010-** TOOL-ASSY, GEAR CHANGE 	R0512-71030-** HANDLE, LIFTING 
R8208-01030-** WRENCH-COMPL, BOX (32)  Subtense distance: 32 m	77102-46001 WRENCH, SINGLE OPEN-END (46) 	R8203-43***-** RING-ASSY, SPINDLE CENTERING 	R8237-01***-** RING-ASSY, TRAVELLER CLEARER 

G.1.3 Illustrations of Tools and Gauges

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

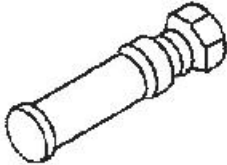
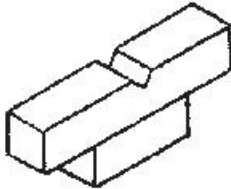
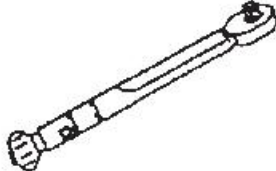
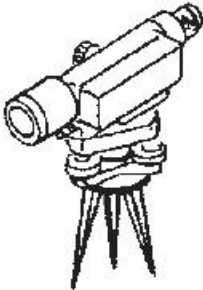
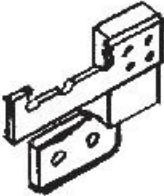
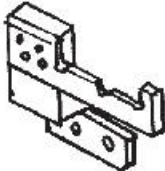
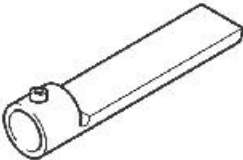
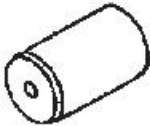
R8205-01***_** TOOL-ASSY, RING PLATE POSITIONING 	R8205-11***_** TOOL-ASSY, RING PLATE POSITIONING 	R8253-01031_** GAUGE, SPINDLE OIL LEVEL HP-S68  HP-S68/HP-S68 (NASA)	R8253-01052-** GAUGE, SPINDLE OIL LEVEL CS1, CS1-S  CS1, CS1-S
R8253-01062-** GAUGE, SPINDLE OIL LEVEL CS1-12, CS21-12  CS1-12, CS21-12	R8253-21***_** TANK, LUBRICATION APPARATUS  TexParts	R8253-31***_** NOZZLE, LUBRICATION  TexParts	R8253-31***_** NOZZLE, LUBRICATION  NOVIBRA
R8235-01***_** TOOL-ASSY, SNAIL WIRE CENTERING 	R8203-41***_** SLEEVE, SPINDLE CENTERING 	R8239-01***_** GAUGE, BOBBIN CHECK 	R8273-01010-** TOOL-ASSY, BELT TENSION LUWA 
R8205-610*0-** BOBBIN, BAL-CON RING CENTERING 	R8205-5***0-** GAUGE, BAL-CON RING CENTERING 	R8217-11010-** TOOL ASSY, BOLSTER  For finger brakes.	71106-08001-** BOLT, REAMER M8  For electronic draft specification

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

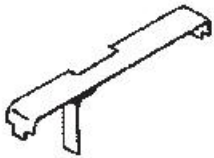
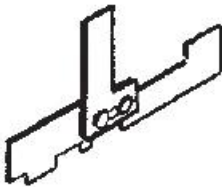
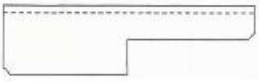
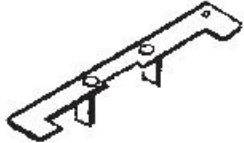
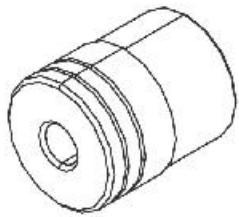
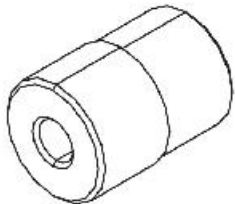
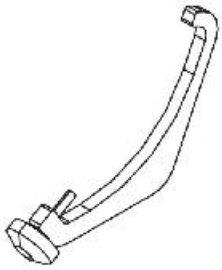
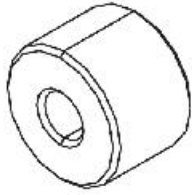
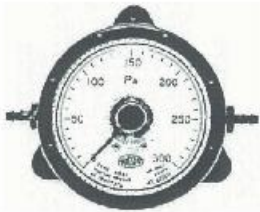
R8203-37010-** BLOCK, BELT TENSION E-DRAFT  For electronic draft specification	R8203-55010-** TOOL, BEARING POSITION 	R8203-57010-** TOOL, BEARING SLEEVE POSITION 	R8203-50010-** TOOL-COMPL, BEARING NUT 
77105-00023 WRENCH, TORQUE (50N) 	R8297-01010-** TOOL-COMPL, TRUMPET 	77135-00026-** TOOL, BELT TENSION 	77135-00027-** SENSOR, BELT TENSION 
R8207-21010-** TOOL-COMPL, MAIN MOTOR POSITION 	68601-00001 BAND, CV-250A 		

[2] For Installation Only

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

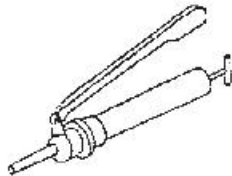
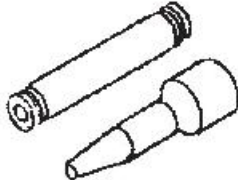
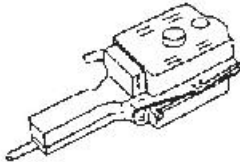
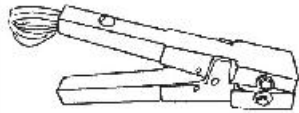
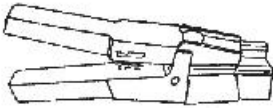
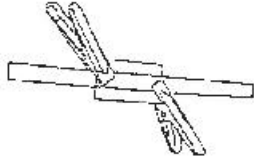
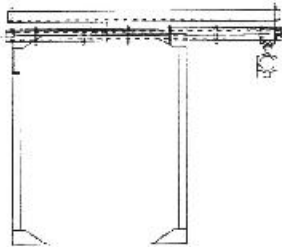
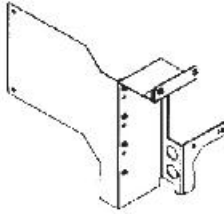
R8203-16010-** GAUGE-ASSY, SPINDLE RAIL STRAIGHT 	R8203-18010-** GAUGE, SPINDLE RAIL STRAIGHT 	R8203-11010-** TOOL-ASSY, MACHINE CENTER POSITIONING 	77105-00001 WRENCH, TORQUE  For roller stands and line shaft couplings
77104-13003 SOCKET, ROLLER STAND WRENCH  For roller stands	77105-00021-00 SOCKET, HEXAGON (5)  For line shaft couplings	77133-00008 TRANSIT 	77101-24002 SPANNER, DOUBLE END  24x30
R8209-01***-** GAUGE-ASSY, LIFTING UPPER BKT. POS. RH 	R8209-01***-** GAUGE-ASSY, LIFTING UPPER BKT. POS. LH 	R8277-00011-** TOOL, LIFTING SHAFT 	R8285-01010-** ROD, OE HEAD CENTERING (INSIDE) 

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

R8206-010**_**	8206-310**_**	R8206-11011-**	R8206-41***_**
GAUGE, TIN PULLEY POSITIONING (Z)	GAUGE-COMPL, TIN PULLEY POSITIONING (SZ)	GAUGE-ASSY, JOCKEY BRACKET COLLAR POS.	GAUGE, TAPE TENSION LEVER
			
For Z twist. (70 G and 75 G)	For S/Z twist.	For Z twist. (70 G and 75 G)	
77112-04003	R8204-01010-**	R8291-01020-**	R8291-11010-**
WRENCH, HEXAGON FOR TIN PULLEY	GAUGE-ASSY, ROLLER STAND. POS	TOOL-ASSY, CARRIER GEAR POSITIONING	TOOL, ROLLER STAND POSITIONING
			
R8291-21020-**	R8291-22010-**	R8291-41010-**	R8291-31010-**
HOOP, CHECK DELIVERY	HOOP, CHECK FRONT	CLAMP-ASSY, POSITIONING	RING, CARRIER GEAR POSITIONING
			
R8294-01010-**			
			

[3] For Maintenance Only

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

77140-00007 PUMP, GREASE 	77140-00008 NOZZLE, GREASE PUMP 	R8236-01***_** TOOL, SPINDLE DRIVE BELT PRESSURE WELDING 	R8236-02***_** TOOL, SPINDLE DRIVE BELT PRESSURE WELDING 
R8236-12010-** TOOL, COOLING CLAMP 	R8236-22***_** TOOL, GUIDE RAIL 	R8288-01000-** ROLLER-ASSY, CHAIN BLOCK 	R8207-0101*_** COVER-ASSY, MAIN MOTOR BELT 

Ring Spinning Frame
Instruction Manual
Model RX300
(SECOND EDITION)

Ring Spinning Frame Instruction Manual Model RX300

Thank you for purchasing the RX300 Ring Spinning Frame.

This instruction manual describes the correct installation, operating principles, function, adjustment, and maintenance of the RX300 motions, all of which should be familiar to all personnel concerned.

Before operating, adjusting, or maintaining the RX300, be sure to read this manual carefully to understand the RX300. Always keep this manual in a safe and fixed place.

If you have any questions concerning the machine, please contact us at the following locations:

HEAD OFFICE: TOYOTA INDUSTRIES CORPORATION

TEXTILE MACHINERY SERVICE DIVISION

1, Toyodacho 2-chome, Kariya-shi, Aichi, 448-8671 JAPAN

Tel: +81 566 22 2511

Fax: +81 566 27 5679

INDIA: KIRLOSKAR TOYODA TEXTILE MACHINERY (P) LTD.

Plot No.10-13, Phase II, Jigani Industrial Area

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Specifications, operating instructions, and dimensions in this manual are subject to change for improvements without prior notice.

TOYOTA shall take no responsibility for loss, damage, expense or claims for bodily injury or property damage arising from incorrect usage which is not in accordance with the instructions given in this manual.

In no event will TOYOTA be liable for products resulting from the use of this machine.

About The RX300 Instruction Manual

This manual is basically made up of 12 Chapters and Appendix as listed below:

Chapter S. SAFE WORK

Chapter 1. GENERAL

Chapter 2. GEARING AND VARIOUS SETTING

Chapter 3. INSTALLATION

Chapter 4. ADJUSTMENT

Chapter 5. OPERATION

Chapter 6. SPINNING

Chapter 7. OPERATION PANEL

Chapter 8. INSTRUMENTATION

Chapter 9. TROUBLESHOOTING

Chapter M. LUBRICATION • MAINTENANCE • DISASSEMBLY/REASSEMBLY/ADJUSTMENT

Chapter G. TOOLS AND GAUGES

Chapter A. APPENDIX

- Your manual may not contain all of them since it is edited to conform to the specifications of the spinning frame you have purchased.
 - Each chapter gives the outline of the mechanism and its sketch, which are followed by the details consisting of description and photos/sketches.
 - One of the following titles will be prefixed to each description:
⚠ WARNING, ⚠ CAUTION, NOTE:, OUTLINE:, FUNCTION:, OPERATION:, ADJUSTMENT:, and REFERENCE:.
- (1) ⚠ WARNING
The safety alert symbol ⚠ WARNING is used in this manual, alerting you to a situation that might cause serious injury or death to the operator if he or she does not follow the instructions in this manual necessary to avoid any dangers in the machinery.
 - (2) ⚠ CAUTION
The safety alert symbol ⚠ CAUTION is used in this manual, alerting you to a situation that might cause minor injury to the operator if he or she does not follow the instructions in this manual necessary to avoid any dangers in the machinery.
 - (3) NOTE:
The NOTE: mark is used here, alerting you to possible damage to the machinery if the operator fails to follow the instructions in this manual.
 - (4) OUTLINE:, FUNCTION:, OPERATION:, ADJUSTMENT:, and REFERENCE:
These marks have been adopted in order to help the operator understand the contents of this manual.

■ Abbreviations and Notations

This manual uses the following notations for clarity purposes.

• Ring spinning frame, model RX300	RX
• Stationary cop doffer installed on RX300	SCD
• Bobbin exchanger connected to the RX300 ring spinning frames	TBC
• Gear-end frame of RX300	GE
• Out-end frame of RX300	OE
• Middle-head of RX300	MH
• RX300 ring spinning frames consisting of OE, MH and GE	3-head version
• RX300 ring spinning frames consisting of OE and GE only	2-head version
• 2-head frames with the OE auxiliary gearing	Long frame
• 2-head frames without the OE auxiliary gearing	Short frame

S.1 Safe Work

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Introduction

 **WARNING**

There is no such thing as a perfectly safe machine when improper handling or ignoring precautions stands in the way. Any incorrect usage could possibly result in a serious bodily injury, in the worst case it could cause death, and/or substantial property damage.

 **CAUTION**

TOYOTA has made every effort to assure as safe work as possible, which cannot be completed, however, without your understanding and cooperation.

It is impossible for the manufacturer to take into account individual operating conditions of the machinery at the user site and prepare an instruction manual covering all information relating to the machine operation. We, therefore, ask you to establish your own individual safety standards for each safe job of installation, operation, adjustment, and maintenance.

S.1.1 Rules for Installation Work

[1] Before Installation

- (1) Check the safety rules and the workmanship standards for the plant.
- (2) Make sure that all personnel involved know the nature of the job and the installation procedure, and agree as to the best way to get them done.
- (3) For jobs requiring a group effort, choose a supervisor whose instructions should be followed thoroughly by all.
- (4) For jobs requiring a group effort, agree beforehand on words or gestures for giving and confirming signals.
- (5) Wear safety shoes.
- (6) Check the work places and their surroundings. If any unsafe point is found, take the necessary action to make it safe.



1. When foundation bolts, power cable conduits and air inlet piping are spread out before installation, mark them clearly with brightly colored cloth or a flag so that workers can avoid tripping or hitting the RX and carriers against them during installation.



2. If there is any unstable footing due to any pits (for exhaust, piping, wiring, or other purposes) which are dangerously uncovered, put on a temporary cover to prevent falling accidents.
3. Use specified tools matched to the job to be done.

[2] During Installation

[2.1] General Points for Installation Work



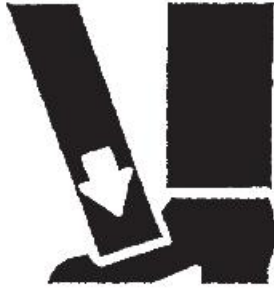
- (1) Always wear a helmet whenever installation is being carried out at the same time as other jobs, such as construction and piping.
- (2) Always wear gloves whenever there is the possibility of injuring hands or fingers.



- (3) Never use gloves if there is the possibility of their becoming caught in a rotating section of the RX.
- (4) Never get oil or grease on the floor, since these can cause slipping accidents.
- (5) Always provide a stable platform or scaffold for those jobs in places too high to reach from the floor.



- (6) Never climb onto a heavy hoisted object nor get under it.
- (7) Keep your tools, parts, devices and instruments neatly arranged, and observe the following rules:
 1. Put them where they are not likely to fall down.
 2. Whenever standing or leaning them against something else, do what is necessary to prevent them from falling over.
 3. Whenever piling round bars or pipes, do what is necessary to prevent them from falling down.



- (8) Observe the following rules when conducting a group effort:
1. Choose a supervisor whose instructions should be followed thoroughly by all.
 2. Agree beforehand on words or gestures for giving and confirming signals.
 3. Be especially careful when handling heavy objects. If the weight exceeds 20 kg, two or more workers should handle them.

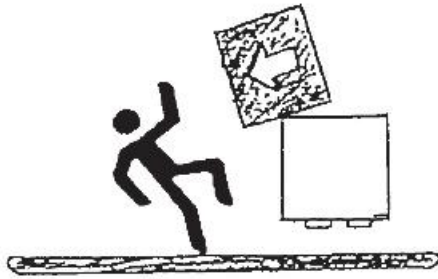
[2.2] Transport



- (1) Check out the transport route beforehand; this will give you a chance to minimize obstacles, bumps or slopes.
- (2) Before bringing in machinery, always prepare well-maintained carriers.
- (3) When unloading the machinery from a truck, be sure to:
 - use a fork lift with sufficient load capacity (3 ton or more)
 - secure long packages with ropes or belts to prevent the machinery from falling down or toppling.



- (4) Never lift the load on the carriers any higher than 200 mm above the floor.
- (5) Never stand in small spaces between the load and wall during transportation.
- (6) Always assign a guide and transport according to his or her instructions. The guide should pay sufficient attention to any protruding parts, bumps or slopes on the transport route.
- (7) Whenever inserting wooden blocks under the load, never let fingers get between the load and floor.



- (8) Always push hand carts when carrying loads.
Never pull them.
- (9) Fix the load with ropes or other means if necessary, to prevent the load from falling down during transport.
- (10) Always lift up the GE using ropes or belts from the front door side (since the center of gravity lies at the front door side), in order to prevent the frame from falling down.
- (11) When transporting the intermediate units with a fork lift, be sure to check that the fork catches the skid and balances it securely.
- (12) When using a dedicated hoisting carriers or transporting tools, make sure that the transporting beam holds the spindle rail of the intermediate units and balances them securely.
- (13) Heavy components including spring pieces, spindle rails, roller beams and fluted rollers, and long components including draft rods and tin pulley shafts are palletized or packed in boxes.
When bringing these in with a fork lift or cart, secure them with ropes if necessary, in order to prevent them from falling down.
- (14) Heavy components including main shafts and doffing bars are packed in boxes. When bringing these in with a fork lift or cart, secure them with ropes if necessary, in order to prevent them from falling down.
(SCD specification)

[2.3] Unpacking and Cleaning



WARNING

Never apply gasoline or other volatile cleaning agents for cleaning.

- (1) Parts are coated with rust-preventive oil.
Take necessary action so they will not slip when carrying them.
- (2) When washing parts, use waterproof paper to prevent the floor from becoming stained.
- (3) Use Nippon Oil Corporation New-sol Delux or an equivalent cleaning fluid.
Never use trichloroethylene-base cleaning fluid; otherwise the painting will peel off or discolor.
- (4) Never put anything on the parts storage area, passages, or footing area.
Never pile up spring pieces, spindle rails or draft rods any higher than three layers.
When temporarily storing tin pulley shafts, creel pillars, and other parts, make sure they are secured and will not fall down.
- (5) Watch out for stray nails or tie hoops which may come out during unpacking.
Do not step on them or hurt yourself with them.

[2.4] Handling Heavy Components

When handling heavy components as given below, work in a comfortable position. If the weight exceeds 20 kg, two or more workers should handle it.

- GE ASSYs, spring pieces, draft rods, spindle rails, OE ASSYs, tin pulley shafts and MH ASSYs
- Main shaft, and doffing bar (SCD specification)

[2.5] Handling Long Parts

- (1) Long parts should be placed so that they will not fall. If necessary, provide anti-slipping measures or protective fences.
- (2) Pay attention to the surroundings when handling long parts as given below. If one person is not enough, have several workers handle them.
 - Draft rods, spindle rails, tin pulley shafts, ring plates, fluted rollers, line shafts, traverse bars, wire ducts, pneumatic ducts, roving pipes, creel pillars & rails, lappet angles, and tension pulley shafts etc.
 - Doffing bar, tilting rod, main shaft, etc. (SCD specification)

[2.6] Working in Low Positions

- (1) In working with adjustment bolts in a low position, be careful when standing up so as not to drop straightedges and parallel rulers which may cause injury.
- (2) When centering the tin pulley shafts or installing the tin pulleys and line shafts in a bent over or low position, keep communicating with co-workers through words or gestures. Be careful when standing up, not to injure your head.
- (3) In working with tray rails in a low position, be careful when standing up so as not to injure your head and upper part of your body. (SCD specification)

[2.7] Assembly and Adjustment

- (1) Rough assembly
 1. When removing skids from the GE head, OE head, and MH, communicate with co-workers sufficiently to prevent hands from becoming crushed.
 2. When using the dedicated transporting tools for approaching the intermediate units to the adjacent units or GE/OE heads and MH, move the intermediate units slowly and carefully. Link the RXs as a team and communicate with co-workers sufficiently to prevent hands from becoming crushed.
- (2) Levelling the RX
 1. When using straightedges, parallel rulers, or levellers, be careful not to drop them onto the workers below, who are busy with the adjustment bolts.
 2. When moving straightedges, parallel rulers, or levellers, be sure to do so together with the aid of coworkers. Never attempt to move these devices alone or in a strained position.
- (3) Installing the tin pulley shafts

When using, moving or setting dedicated tools for centering the tin pulley shafts or positioning tin pulleys, be careful not to drop any of these on your feet.
- (4) Installing the creel parts
 1. Watch your step when climbing onto or off of the RX or any platforms used. Also, use only platforms which are sufficiently stable and sturdy.
 2. When workers are busy below, never install the creel rails or bobbin hangers since those components are always installed above. Dropping parts or tools can cause injury to those below.
- (5) Installing the roller parts
 1. When connecting the rollers, fix the connecting tools securely with no danger of slipping, onto the fluted rollers.
 2. When installing the bottom rollers onto the roller stands, do so as a team and assign a leader, communicating with words or gestures.
- (6) Heat-bonding the spindle drive belts

For belt bonding, use a heater. Be careful with the heater, which can reach temperature of from 80° to 90°C.
- (7) When installing the doffing bars, main shafts, and tilting shafts, work as a team and never try one-man operation in a difficult position. (SCD specification)
- (8) When installing the timing belts, take care to prevent hands from becoming crushed. (SCD specification)



(9) Wiring

1. Never allow non-qualified workers to carry out connection or disconnection of the primary power lines.
2. Before starting wiring work, be sure to check that the main circuit breaker is open and the warning notice (tag) is put up for all to see.
3. Before starting wiring work, make sure that the lines are not alive or no voltage is applied to the lines.
4. Make sure that the grounding wire provided on the plant's power supply is connected to the PE terminal inside the control box.

[3] Before Trial Running

- (1) Clear away bolts, nuts, tools and other unnecessary things around, on and under the RX.
- (2) Check that all sections of the RX are securely tightened and that the safety covers are on.

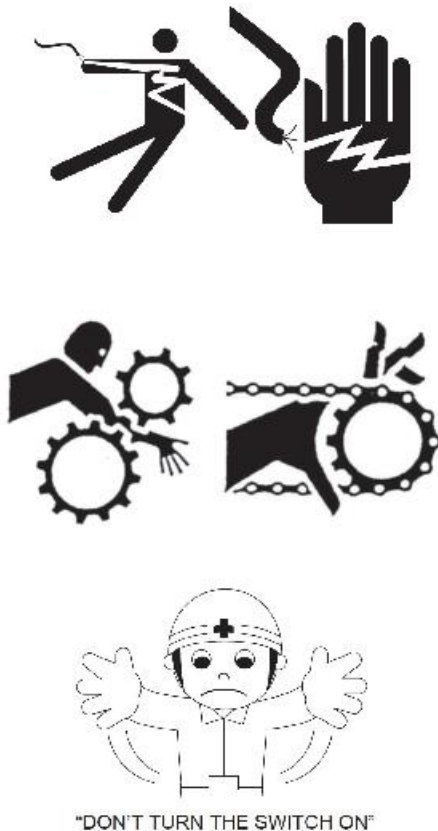
[4] During Trial Running

- (1) Rotate the drive belts and chains on each of the drive sections manually to check for fraying, breaks or other damage. Make sure to communicate clearly with co-workers so that no one's hand becomes caught in running belts or chains.
- (2) Check the wiring and routing of the RX are correctly made.
- (3) Check the rotation direction for: the suction motor, doffing motor, and fan motor.
- (4) Check the functions of each of the stop motions and limit switches.
- (5) When starting the RX, communicate your intention to co-workers, and wait for them to confirm it. Then, check that the RX starts and stops normally.
- (6) When adjusting the tape tension pulleys while they are rotating, do so in a careful, comfortable position.
- (7) For centering of the spindles, first stop the RX and center them while turning the running parts by hand.
Never do this while the RX is in operation; it is extremely dangerous.
- (8) Never reach out towards the reciprocating sections activated by the air cylinder in the peg tray transporting unit. (SCD specification)
- (9) When checking the rotating sections (e.g., pulleys, gears, and shafts) for abnormal vibration, noise, or heat of bearings, never touch those sections. (SCD specification)

S.1.2 Rules for Safe Operation

[1] General Rules

[1.1] Absolute Precautions



- (1) Never allow non-qualified workers to carry out connection or disconnection of the primary power lines.
- (2) Never try any hot-line job when changing the wiring on the RX.
- (3) Never start the RX without communicating your intention to co-workers or without confirming their answer to your signal.
- (4) Never touch rotating or operating parts until the RX comes to a complete stop. In the automatic doffing operation, be careful even if those moving parts seem to have stopped. The RX may stop temporarily, but it is still dangerous.
- (5) Never operate the RX in clothes which could become entangled in the rotating parts.
- (6) Never remove a warning notice, caution plate or instruction plate from the RX, no matter what.

[1.2] Handling Abnormal Situations

- (1) Always turn the power off before making any adjustments or repairs to correct abnormalities occurring during operation.
- (2) If you turn off the RX, be sure to put up the warning notice on the power switch.
- (3) The temporary warning notice should be removed only by the person who put it up, once it has become unnecessary.

[1.3] Other Precautions

- (1) The supervisor should understand these safety rules given in this section and make sure that each worker sufficiently observes them, for ensuring safe work and operation. The supervisor should always keep in mind that if any of these safety rules is not observed, serious injury or death might be caused to the related workers.
- (2) Observe the safety regulations enforced in the destination country for the RX.

[2] Precautions for Spinning

[2.1] Starting

When two or more workers are to handle jobs, they must always communicate with words or gestures before starting up the RX.

[2.2] During doffing

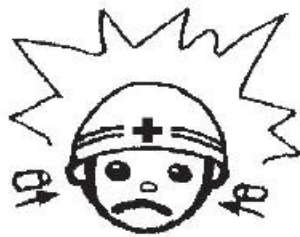
- (1) No one other than the person in charge must take recovery action if any of the electrical parts in the control box operates so as to cause the SCD or RX in operation to either stop or become non-workable.
- (2) While the SCD or RX is in operation:
 1. Never touch the running portion.
 2. Never reach out towards the reciprocating sections activated by the air cylinder in the peg tray transporting unit.
 3. Never open or remove any of the safety covers.
 4. Never try to remove yarn or fly.
- (3) When the doffing bar is in operation, never stand in the area between the RXs.
- (4) If the RXs equipped with an SCD come to full-bobbin state, immediately go out of the area between those RXs.
- (5) If it is unavoidable to put roving carts or other carriers into the area between the RXs, be sure to check that those RXs will not come to full-bobbin state soon. Also, be careful not to bump those carriers against the SCD when travelling through.
- (6) Do not operate the SCD or RX in these types of clothes:
 1. Loose fitting jacket
 2. Long sleeves with buttons
 3. Work cloths with large buttons sticking out in front
 4. Sandal-type shoes
- (7) Never put scissors or tools in a non-flap breast pocket.
- (8) Never restart the SCD or RX without permission if it is stopped by:
 1. A person in charge of maintenance
 2. A patrol inspector
 3. A person in charge of lubrication
 4. Other responsible people

[2.3] Other Precautions

- (1) When removing fly or fleece entangled around the top rollers, remove the top roller from the RX or hold it in one hand. Be careful that fly or fleece removed from the element never falls onto your feet or the rotating section.



- (2) Put on a gauze mask in the room when the machine is in operation. There will be a lot of invisible fly, fleece or yarn particles floating around.



- (3) Put on a pair of ear plugs to protect your ears from noise when working around operating machines for a long time. When the RX is in operation, the noise level usually exceeds 70 dB (A).



- (4) Be sure to clean the machine to prevent fire as follows:
 - Periodically wipe off fly or fleece accumulating around the motors. Even though the thermal sensor works if the motor temperature exceeds the specified level, this is no excuse to neglect any cleaning.
 - Periodically remove fly or fleece accumulating around the magnet switch and its surroundings in the control box, using a vacuum cleaner. When activated normally, the magnet switch will spark which could result in fire if fly or fleece accumulates around the magnet switch.

S.1.3 Rules for Maintenance

[1] Before Maintenance Work

[1.1] Checking the Work Procedure

Check the work procedure with co-workers in advance. Be sure to inform the spinning operators that the RX is to be stopped, and always put up the maintenance notice on the power switch.

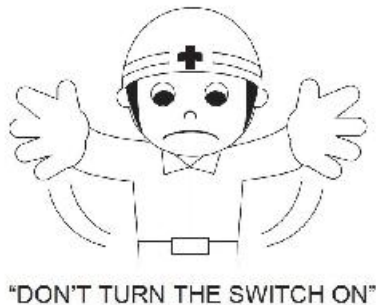
[1.2] Checking the Tools

Select and inspect the tools for the job purpose. Use spanners and wrenches suitable for the sizes and locations of bolts and nuts.

[1.3] Keeping Things Neat and Tidy

Determine the storage location for disassembled parts, making sure that passages are clear for frame operators.

[2] Precautions for Maintenance Personnel



- (1) If you stop the RX for maintenance, be sure to put up the warning notice saying "DON'T TURN THE SWITCH ON."
- (2) Never put tools or any items on top of the RX whether it is in operation or on halt. Otherwise, they may fall into the frame, causing damage or bodily injury.
- (3) Never use compressed air for cleaning your skin since it may cause infection at an open wound.



- (4) Lubricant, paint, bond, sealing agent or detergent may damage skin or eyes. Always wear suitable protection such as safety gloves and goggles when using such materials. If any of these come into contact with skin or eyes, wash them with water immediately and seek medical treatment. When using any washing solution, always ventilate the room sufficiently. Follow the instructions provided by the material manufacturer or supplier.



- (5) For any work which could damage the eyes, always wear safety goggles.

[3] During Maintenance Work

[3.1] Maintenance

- (1) Installing or removing the parts inside the GE ASSY
 1. Since the GE ASSY incorporates a variety of automatic devices, be sure to stop the RX in the reference position, so that parts will not have to be forced in or out.
 2. Parts can easily become slippery due to grease, oil, fly or fleece, so clean them off as thoroughly as possible and hold them securely, preventing dropping and injury.
- (2) Installing or removing the motor pulleys, timing pulleys, and driving pulleys
 1. When installing or removing the flat belts or timing belts, be careful not to get your hands caught in the belts.
 2. Since the pulleys are heavy, install or remove them in a comfortable position.
- (3) When removing the motors and impellers from inside the filter box, do so in a comfortable position, communicating with co-workers.
- (4) When adjusting the tape tension pulleys during operation, make sure that your hand does not directly contact the dangerous rotating section, and work in a comfortable position.
- (5) When replacing broken spindle tapes, be sure to stop the RX; otherwise, those tapes may become entangled in the tin pulleys.
- (6) Installing or removing tin pulley shafts require the workers to operate in a difficult squatting or bending position; communicate with co-workers during the job. Also, be careful of your head and body.
- (7) Since the power cylinder is heavy, install or remove it in a comfortable position.
- (8) When adjusting the peg tray, be sure to stop it.
- (9) When adjusting the timing belt of the doffing bar, be sure to clamp the main shaft with a stopper in order to prevent the doffing bar from falling down.
- (10) When the surface of the resin product has become dirty, remove the dirt lightly with a soft cloth soaked in neutral detergent the density of which has been made about 200 times lower with water. (The surface may crack, depending on the ingredients or density of the detergent.) Never use a cleanser, alkaline detergent, scrubbing brush, or a hard cloth.

[3.2] Lubrication

- (1) Make sure that the RX has stopped before greasing of the bearings or gears.
- (2) Always wipe up oil spilled on the floor after supplying oil to the oil bath.
- (3) Waste oil drained from the oil bath should be disposed of in containers specified by the plant.

S.1.4 Rules for Operating or Checking the Electrical Devices



⚠ WARNING The capacitor, inverter, servo amplifier and control power supply board of the main circuit of the machine are charged, and they remain at a high voltage for a while after the main circuit breaker (CB1) is turned off. Any operation must be waited until you make sure that CHARGE LEDs of all inverters and servo amplifiers turn off after at least three minutes from turning the main circuit breaker off.

Also, before starting an operation, measure the voltage of parts which may be touched and ensure safety.

- (1) All operating and checking jobs must be carried out by persons with appropriate special qualifications (e.g., duly trained persons or electrical experts).
- (2) Always turn off the main switch before opening the control box.
- (3) After turning off the main switch, be sure to put up the warning tag “DON'T TURN THE SWITCH ON” on the main switch.
- (4) Handle an electrical component or part only when no power is supplied to it. Note that the primary side terminals of the main switch are applied with a voltage even when it is turned off.
- (5) Voltage application may be needed for checking control system functions. Be especially careful when conducting such a job.
- (6) Use the measuring devices and tools, all kept in proper condition.
- (7) When connecting the power supply to the loom, always connect the protective wire (green or yellow/green spiral) first to the PE terminal. For disconnection, be sure to disconnect the protective wire last of all.
- (8) During electrical installation work, the observer responsible for security of the workers must absolutely, without fail, attend at the field. The observer should be limited to someone with know-how concerning electrical troubles.
- (9) Never try to modify an electrical unit or device because it may cause a malfunction or accident. If it is inevitable, please consult with us.
- (10) Precautions for disposal of components
When disposing electrical components or wires, they should be separated from general garbage for disposal.
Due caution is needed especially for disposal of items below.

1. LCD panels and backlight

The backlight, a component of the function panel, contains mercury.

Upon disposal, comply with applicable ordinances or regulations.

2. Batteries

EU Directives: 2006/66/EC

The symbol illustrated indicates the need for handling batteries (including accumulators) separately from general garbage for disposal.

Batteries (including accumulators) contain substances harmful to the environment and human body.

In case chemical symbols are displayed below the illustrated symbol, the battery (or accumulator) contains heavy metals above the standard concentration level.

The following is the standard:

Hg: Mercury (0.0005%), Cd: Cadmium (0.002%), Pb: lead (0.004%)



1.1A General

Contents

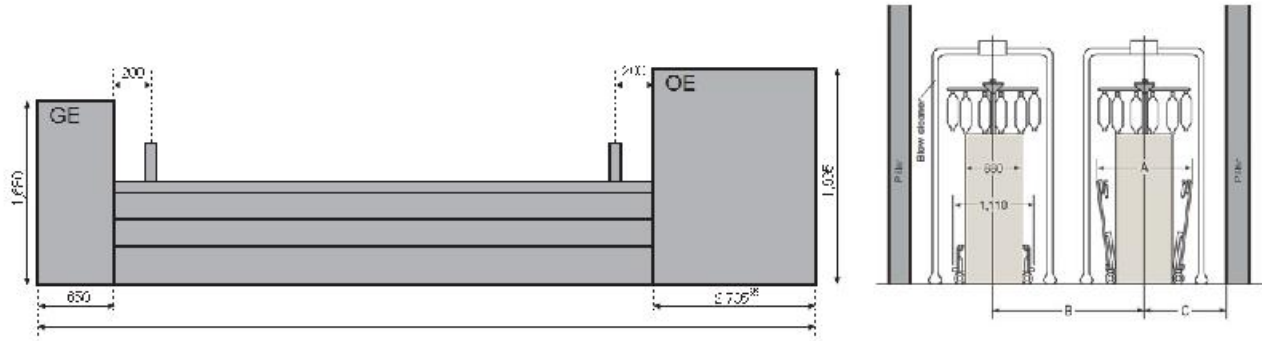
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1.1A.1 Specifications

• Max. spindle speed	25,000 rpm (Mechanical)
• Spindle gage	75 mm or 70 mm
• Spindle drive system	4-spindle tape
• Pneumatic suction	Single-nozzle type
• Yarn length	Cotton to 64 mm
• Yarn number count	Ne 1 to 300 to be set
• Max. number of spindles	1,824
• Ring diameter	36 to 53 mm
• Draft system	3-path, 2-zone
• Surface treatment for bottom rollers	Multilayer chromium plating
• Lifting motion	Screw shaft type, positive lifting
• Raw yarn package	146×406 mm
• Operation panel	Colour function panel
• Lubrication of gearing	Synthesis oil sealing
• Spindle speed change	Arbitrary speed change inverter
• Yarn cutting brake	Provided as an option
• Automatic doffer	SCD (with automatic restart function)
	Winder-linked or TBC bobbin changer

1.1A.2 Intra-Frame Space and Overall Length

■ RX300E dimensions for standard/multi-spindle (2-head) type

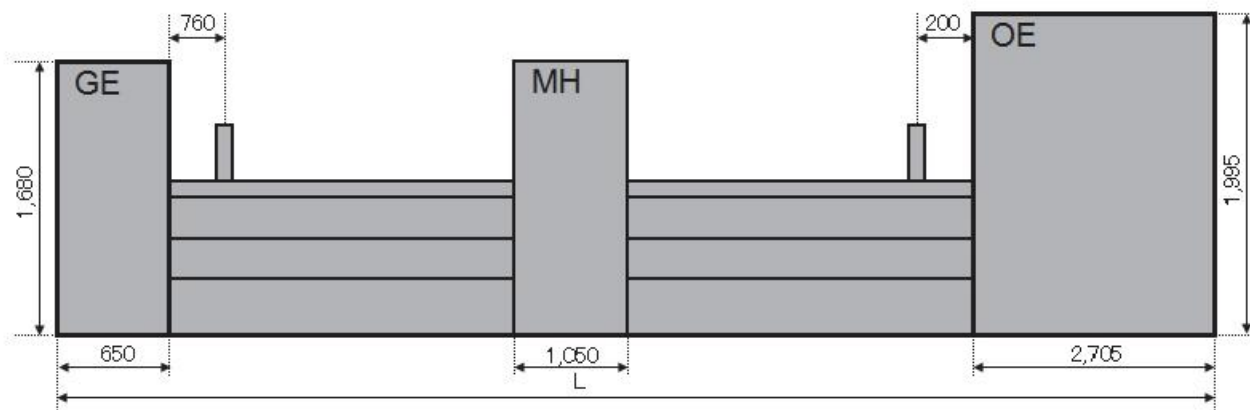


Frame dimensions (L) = GE(650mm) + 200mm + OE(2,705mm[※]) + 200mm + (no. of spindles x no. of gauges) / 2

※The dimension with TBC bobbin exchanger : 3,135mm(75G) / 3,120mm(70G)

- A. Max. width of auto doffer (when doffing) : 1,540mm
- B. Standard length between center lines of 2 adjacent frames : 2,100mm
- C. Min. length between center line of frame and pillar : 1,500mm

■ RX300E dimensions for super-multi-spindle (3-head) type



Frame dimensions(L) = GE(650mm) + 760mm + MH(1,050mm) + OE(2,640mm) + 200mm + (no. of spindles x no. of gauges) / 2

Frame dimensions by the number of spindles: standard/multi-spindle (2-head) type

No.of spindles	No.of blocks	With doffer(with winder link)		With doffer(with TBC)	
		70mmG	75mmG	70mmG	75mmG
480	10	20,555	21,755	20,970	22,185
576	12	23,915	25,355	24,330	25,785
672	14	27,275	28,955	27,690	29,385
768	16	30,635	32,555	31,050	32,985
864	18	33,995	36,155	34,410	36,585
960	20	37,355	39,755	37,770	40,185
1,008	21	39,035	41,555	39,450	41,985
1,056	22	40,715	43,355	41,130	43,785
1,104	23	42,395	45,155	42,810	45,585
1,200	25	45,755	48,755	46,170	49,185
1,440	30	54,155	57,755	54,570	58,185

Frame dimensions by the number of spindles: super-multi-spindle (3-head) type

No. of spindles	No. of blocks	With doffer(with winder link)		With doffer(with TBC)	
		70mmG	75mmG	70mmG	75mmG
1,440	30	55,765	59,365	56,180	59,795
1,632	34	62,485	66,565	62,900	66,995
1,728	36	65,845	70,165	66,260	70,595
1,824	38	69,205	73,765	69,620	74,195

1.1A.3 Features

[1] Operation Panel



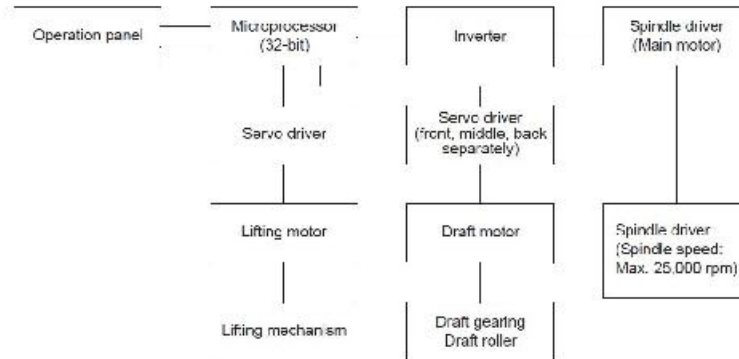
From the operation panel, you can

- set the spinning conditions,
- operate the RX and SCD,
- monitor the operating state, and
- see error messages.

- (1) Setting the spinning conditions
 - Spindle speed change (possible also when the RX is in operation)
 - Twist and yarn count of spinning yarn
 - Cop shape
 - Start and end of winding operation program
 - Height of doffing bar
- (2) Operating the RX and SCD
 - start or stop the RX and SCD
 - operate each device manually
- (3) Monitoring the operating state
 1. Spinning-related data
 - Spindle speed
 - Remaining time length until full bobbin
 - Number of twists, delivery speed, and production per shift
 2. Management data
 - Trouble log
 3. Maintenance tool
 - I/O monitor
- (4) Seeing error messages

If a trouble occurs in RX, the trouble contents and the solutions will be displayed. Also, a message appears to notify the operator of incorrect operation or unsatisfied conditions.

RX control system diagram



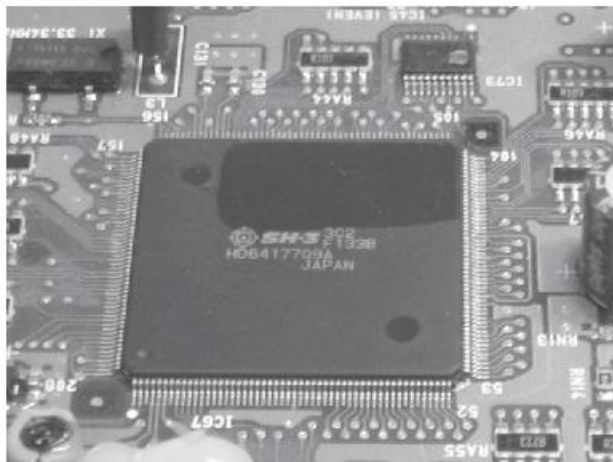
[2] Draft Roller Individual Drive System Using Servomotor

A 3-wire independent servomotor drive system enables break draft fine adjustment without cutting the yarn in addition to changing the spinning yarn twist and yarn count for easy optimization of the yarn quality and spinning condition.

It is also possible to spin fancy yarns such as multislab, multi-count and multi-twist. (Option)

[3] Free Speed Change Inverter

32-bit CPU



A maximum speed can be achieved while minimizing possibility of yarn breakage at doffing through the carefully-thought speed change control system.

Acceleration while adjusting the traveler posture as stable as possible at speed change permits increase of the mean speed with minimum yarn breakage.

[4] Ring Rail Automatic Lowering Device

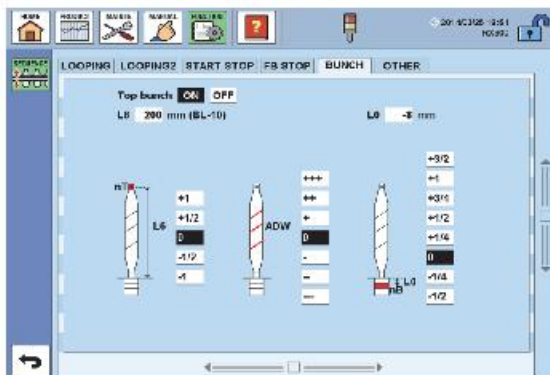
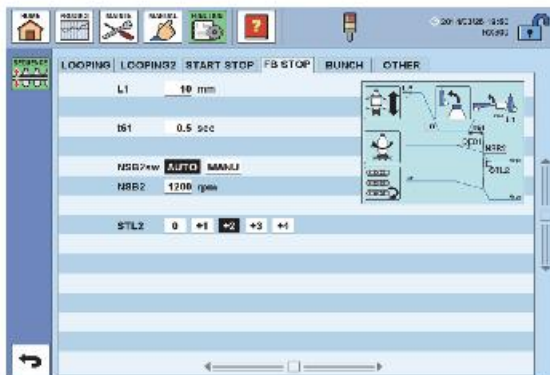
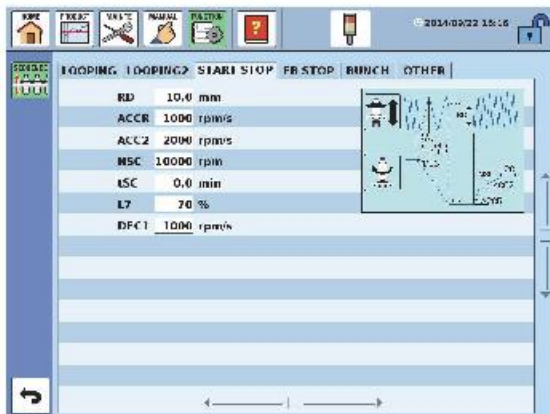
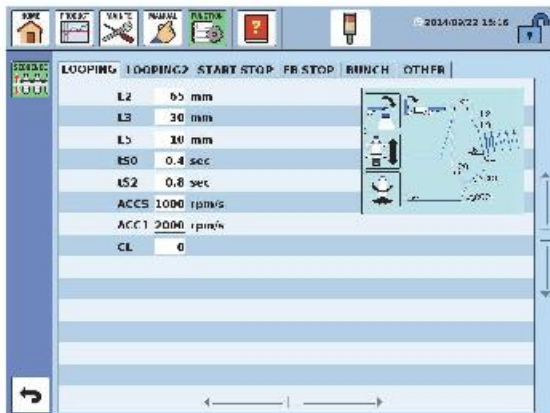
The ring rail automatically lowers upon full bobbin and yarn is wound 1.5 to 2 times onto the seal band.

[5] Automatic Lappet Tilting & Returning Device

At the time of doffing, this device automatically turns up lappets into the tilted position to prevent cops from coming into contact with the lappets.

After completion of doffing, it automatically returns the lappets into the horizontal position.

[6] Preventions Against Yarn Breakage



- (1) Gradual acceleration at the start of running
The gradual acceleration at the start of running prevents rapid change in tension, minimizing yarn breaks.
- (2) Optimum-position stop of the ring rail
When coming to a halt halfway through forming cops, the RX selects the optimum stop position of the ring rail to minimize yarn breaks which are likely to occur at the time of restart.
- (3) Automatic heaving of the ring rail
Upon completion of doffing, the RX automatically carries out ring rail heaving operation for minimizing yarn breaks at the time of restart.
- (4) 1st moving-up of the ring rail after completion of bottom bunch building
The RX moves up the ring rail during slight spindle rotation immediately following the completion of bottom bunch building on the band in order to prevent yarn from catching on other parts, minimizing yarn breaks at the time of restart.

1.1A.4 Overview on Start Up of RX

1. Preparation for acceptance	YES	NO
☐ Completion of building construction and floor work		
☐ Completion of exhaust pit and pit cover work		
☐ Completion of foundation, floor marking and anchor bolt hole work		
☐ Completion of electrical wiring and power distributor		
☐ Completion of ceiling and illumination		
☐ Completion of auxiliary rooms (maintenance and spare part rooms and lavatory)		
☐ Completion of pneumatic piping		
☐ Completion of air-conditioning		
☐ Completion of compressor installation		



2. Preparation for installation	YES	NO
☐ Arrangement of workers		
☐ Arrangement of fork lift, hand pallet lift, jack with jaws, cart, bar and nail puller		
☐ Completion of customs clearance		
☐ Completion of facilities for delivery of and carrying in cases		
☐ Arrangement of installation tools		
☐ Arrangement of cleaning oil (for removing rust-prevention oil: Newsol Deluxe supplied by NIPPON OIL CORPORATION or equivalent)		



Installation can be started.	Supervisors can be dispatched.
------------------------------	--------------------------------



3. Preparation for operation	YES	NO
☐ Arrangement of bobbins and travelers		
☐ Arrangement of lubricant		
☐ Arrangement of lubrication tools (grease gun, spindle oiler, etc.)		
☐ Arrangement of French chalk		



Start of production

NOTE: Items indicated with ☐ marks must be prepared by the user.

REQUEST: Please make a copy of this form, enter check marks to all items and send the form to us when requesting dispatch of installation supervisors.

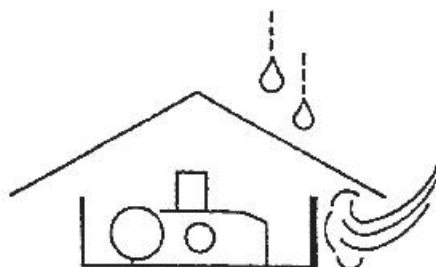
Date: _____

Customer's name: _____

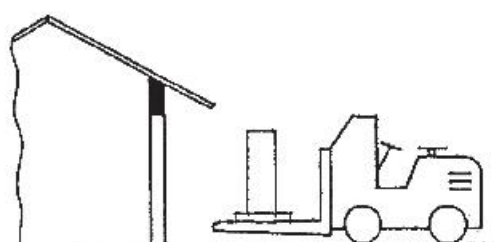
Person in charge _____

1.1A.5 Preparations for Acceptance

[1] Building



- (1) Is the building completed to a level that the RX and accessories can be protected from rain and wind?



- (2) Is the opening sufficiently wide for carrying in the OE head?
 1. Is the width of the opening sufficient to carry the central part of the RX in?
(Minimum width: 3500 mm)
 2. Is the height sufficient?
(Minimum height: 2200 mm)

[2] Foundation



⚠ CAUTION

When anchor bolts, power piping and air inlet piping are embedded before installing the RX, clearly mark them with bright colored clothes or flags to prevent stepping over them or crushing the RX or transportation tools with them.



⚠ WARNING

When exhaust, piping, wiring and other pits are exposed without covers, install tentative covers to prevent dropping or falling accidents.

[3] Wiring and Piping

- (1) Observe the following electrical requirements to ensure the expected performance of the frame and safe operation. For details, consult your electrical constructor and/or power company.

1. Allowable power supply fluctuation

Voltage: Within $\pm 10\%$ the contracted rated voltage

Frequency: Within $\pm 5\%$ the rated frequency

Pay attention to electrical work so that voltage and frequency will not be out of the specified ranges even instantaneously.

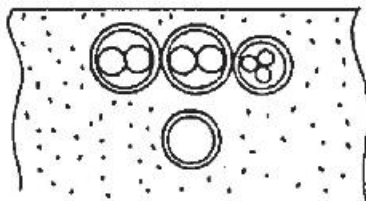
2. Installation of earth leakage breaker

An earth leakage breaker must be installed in the power supply circuit in order to prevent fire accidents.

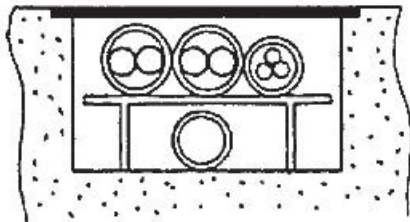
3. Installation of class 3 ground

Connect the ground wire to the ground terminal (E mark) in the control box.

(2) Foundation for wiring and piping



(A)



(B)

- The underground (A) or pit (B) method is generally used. Each method has merits and demerits.
 - Recently, the ceiling suspension method is sometimes reconsidered when combined with automatic delivery systems.
- These methods are determined based on user's policy on overall design of the plant. (Detailed explanation is omitted here.)

Wiring:

Power cables, signal lines (wiring for monitoring, automatic delivery, etc.)

Piping:

Air piping (water piping, etc.)

NOTE: Consult a professional constructor for composition of foundation and depth of underground cables, taking requirements for wiring and piping into account.

NOTE: Pay special attention on the electrical requirement of within 5% voltage drop for wiring.

[4] Case Storage

(1) Storage

Cases delivered to the site are generally piled up for storage. It is necessary to pile up cases in the sequence of unpacking. For this purpose, store cases as instructed below.

1. Divide cases into groups having the same markings.
2. Pile each group so that the case having the smaller number can be unpacked sequentially.
3. Locate groups of cases so that each group faces to a passageway.

A typical storage example is shown on the next page.

(2) Breakdown of cases

At TOYOTA, one RX is principally packed in cases, except certain components. Although the actual packing is advised by the packing list forwarded at shipment, a fundamental division of packing cases is shown below.

Marking	Main component	Example of 1200 spindles	Example of 1824 spindles
		Number of parts/case	Number of parts/case
G	Gear End Head	1/1	1/1
MH	Middle Head	—	1/1
O	Out End Head	5/1	1/1
M*	Middle Blocks	25/1	38/1
A*	Accessories	5/1	8/1
MA	Middle Head Accessories	1/1	1/1
P*	Lifting Parts	5/1	8/1
R*	Bottom Rollers	5/1	8/1
SP*	Spindles	5/1	8/1
S*	SCD Parts	7/1	10/1
CD	Cables & Ducts	1/1	1/1
EX	Extra Parts	1/1	1/1
T	Tools	1/1	1/1
FSP	Spare Parts	1/1	1/1

- The case having the smallest number of a lot may contain materials used commonly for the lot such as adhesive agent and lubricant. These are clearly indicated on the packing list, which should be confirmed upon reception.

[5] Unpacking

Rust preventing treatment is provided to inside of all cases in order to protect parts from rusting during transportation and storage. If a case is unpacked too early, the component is subject to rusting. In principle, cases are unpacked after arrival of TOYOTA's supervisors.

If cases are to be unpacked before arrival of TOYOTA's supervisors for some reasons, refer to Section 3.1 Installation [7.4].

2.1A Gearing and Various Setting

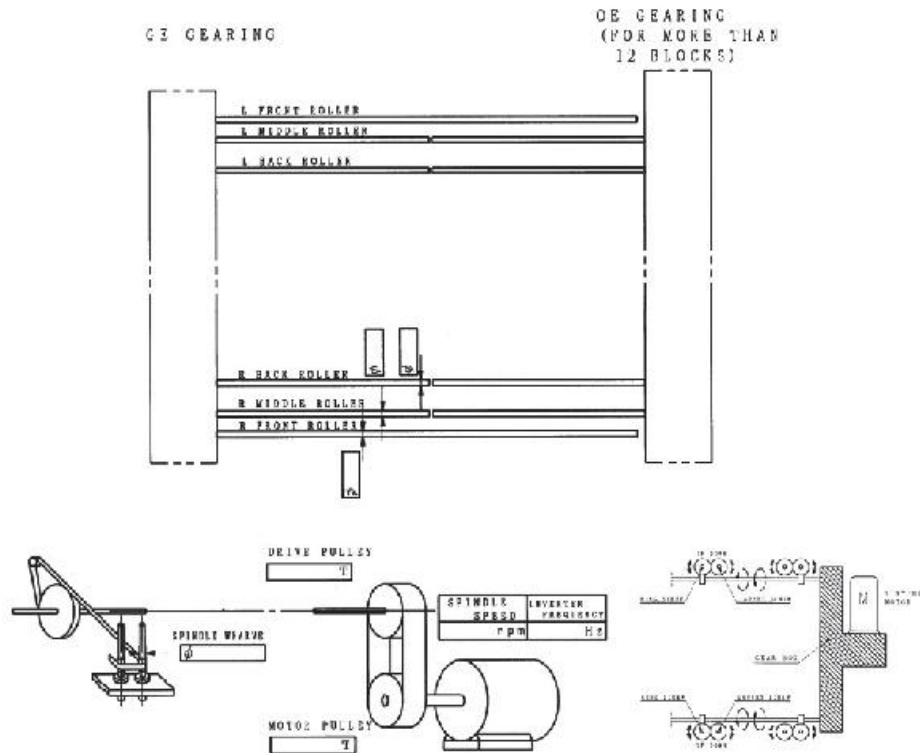
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[1] Gearing Diagram	2.1KE-1
2.1A.2 Panel-entered Parameters and RX Conditions	2.1KE-2
[1] RX Conditions	2.1KE-2

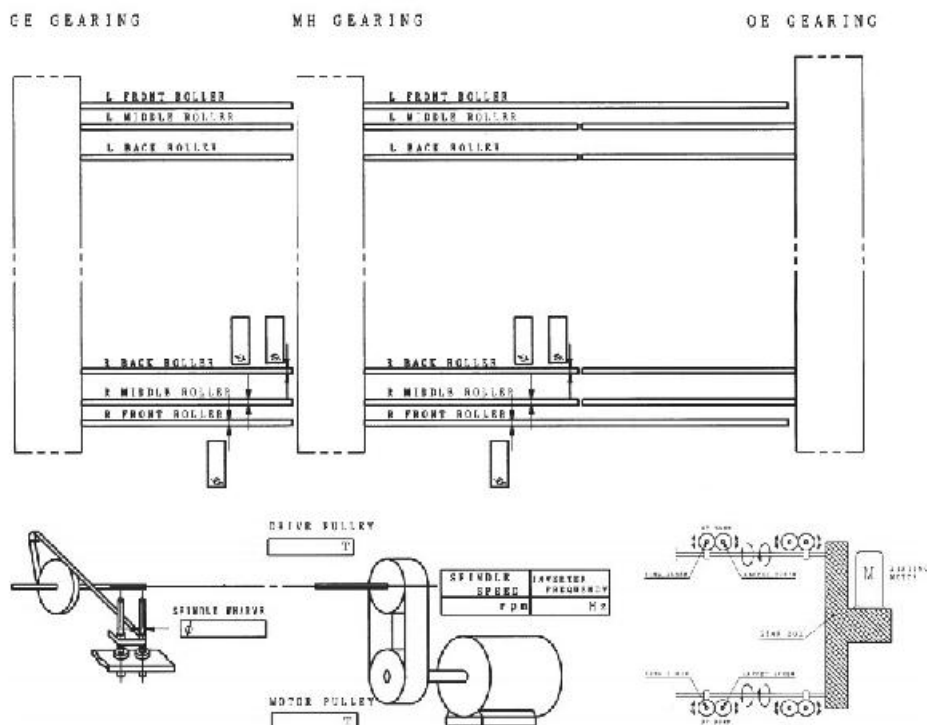
2.1A.1 Various Gearing Calculations

[1] Gearing Diagram

(1) Two-head specification



(2) Three-head specification



2.1A.2 Panel-entered Parameters and RX Conditions

The RX controls the system according to entry from the operation panel provided at the OE. The spindle speed, ring rail operation and other operations are controlled by the computer according to the data entered from the operation panel.

Although the initial data has been set at the time of shipment, the data should be modified to obtain the optimum operating conditions before starting actual automatic operation. (See Section 7.1 for the explanation of parameters and setting procedures.)

[1] RX Conditions

The RX conditions are roughly classified into six as follows :

- (1) Spindle speed
- (2) Number of twists
- (3) Spinning yarn count
- (4) Cop formation
- (5) End program (operation before stopping)
- (6) Start program (starting operation)

4.1A Adjustment

Contents

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4.1A.1 Cautions Before Trial Run

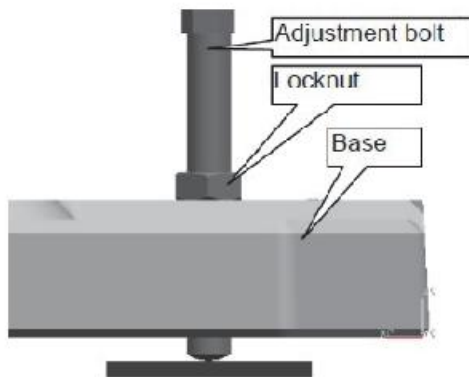


⚠ CAUTION

Observe the safety rules given in

- S.1 “Safe Work”
- S.1.2 “Rules for Safe Operation”
- S.1.3 “Rules for Maintenance.”
- S.1.4 “Rules for Operating or Checking the Electrical Devices.”

[1] Check of Loose Adjust Bolt and Lock Nut



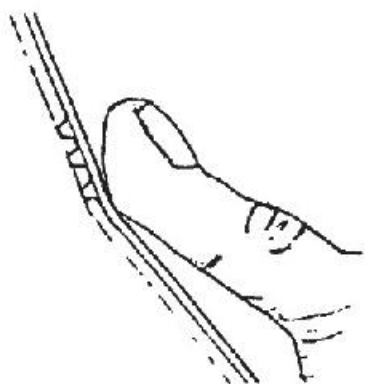
- (1) Check if the adjustment bolt of each head base is floating and the locknut of the base is loose.



- (2) Tap the foot with a wrench to check whether the adjustment bolt in the intermediate section is floating.
- (3) Tighten further the locknut of the adjustment bolt in the intermediate section with a wrench to check whether the nut is loose.

[2] Check of Drive Timing Belt Tension

Check the tension with a tension meter. Refer to Subsection 4.1.13.

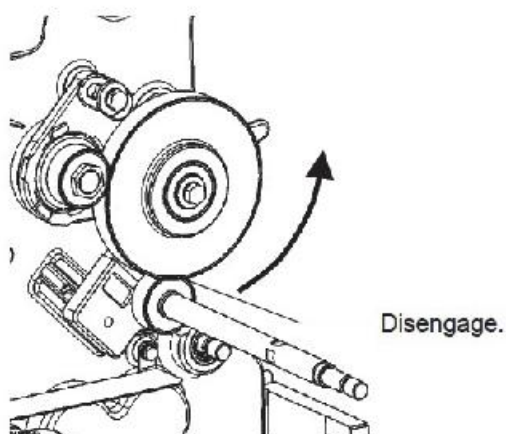


[3] Check of Loose Bolts for each head

Check for loose bolts in GE and OE (auxiliary).

[4] Check of Gearing and Change Gear

- (1) Disengage the back roller lever bracket.



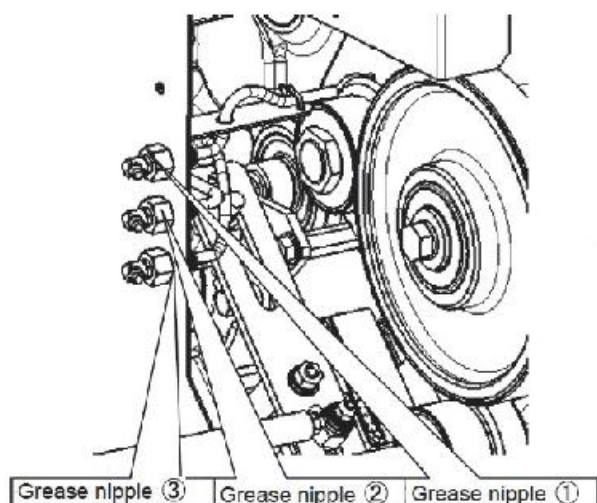
- (2) Check to see that the gear is smeared with grease.

If grease does not stay on the gear, use a grease gun and supply grease through each grease nipple. (Grease type: D)

Grease nipple ①: Back roller gear LH

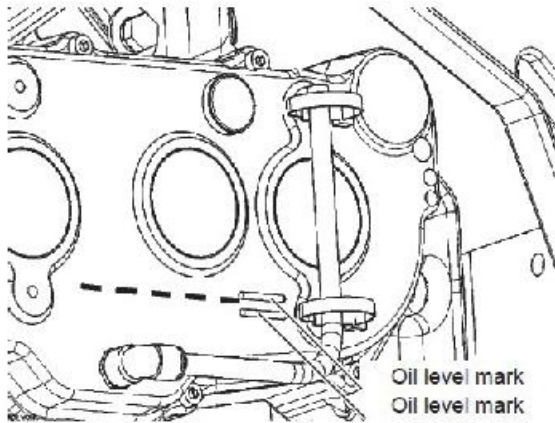
Grease nipple ②: Back roller gear RH

Grease nipple ③: Traverse motion drive worm



[5] Lubricating oil level check

Check to see that the specified amount of lubricating oil is filled in each of heads GE and OE.



(1) Front gearbox

The oil level in the drain hose must be within two level mark lines.

(2) Middle gearbox

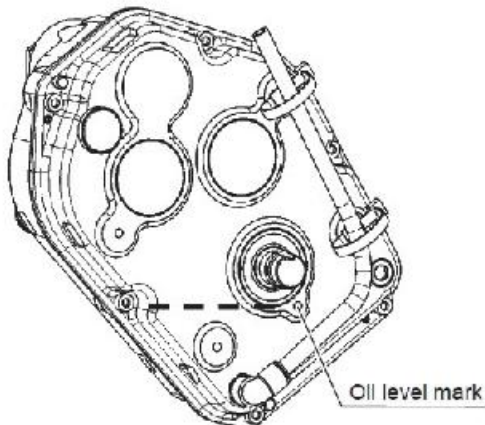
The oil level in the drain hose must be as high as the level mark (machined hole).

NOTE: Do not replace the middle gear box with that of another frame since the reduction ratio of the middle gear box may be different from other frames.

(3) Back gearbox

The oil level in the drain hose must be within two level mark lines.

*For the oil, refer to Section M.1A.



4.1A.2 Inspection on Control Box Connection



CAUTION

Observe the safety rules given in

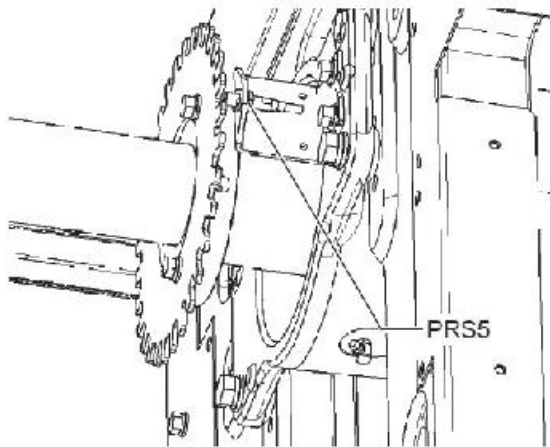
S.1 “Safe Work”

S.1.4 “Rules for Operating or Checking the Electrical Devices”



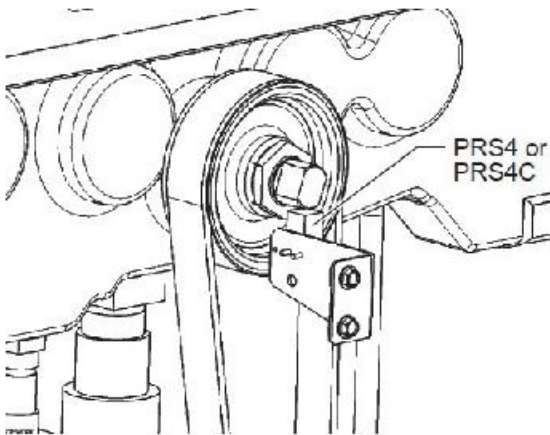
- (1) Check the connection of the wires in the OE control box at the RH side.
Also check that the connectors are firmly plugged in the mother board.
- (2) Check the connection of the wires on the terminal board of the inverter box located at the RH side of the OE.
- (3) Check the connection of the wires on the GE terminal board. Also check all hooking wires are connected correctly.
- (4) Check the connection of the wires on the MH terminal board. (Only for the 3-head version)

4.1A.3 Adjustment of Proximity Switch Positions



- (1) Adjust the gap of the tin pulley shaft rotation sensor (PRS5).

Adjustment range: 1.5 to 2.0 mm



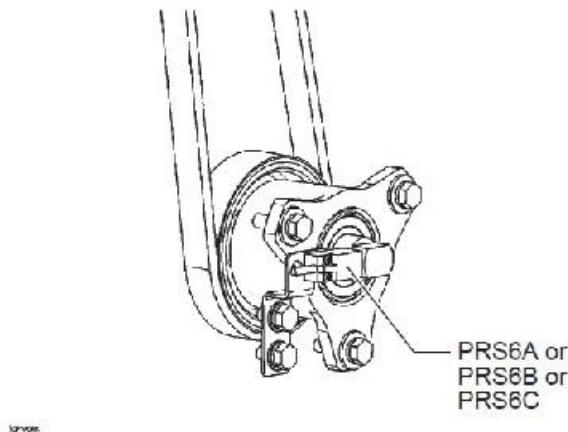
- (2) Adjust the gap of the front roller rotation sensor.

Adjusting range: 1.5 to 2.0 mm

(distance between sensor surface and shaft cylinder surface)

Sensor symbols are as follows:

- Three-head machine: PRS4 for MH and PRS4C for GE
- Two-head machine: PRS4 for GE



- (3) Adjust the gap of each middle roller rotation sensor.

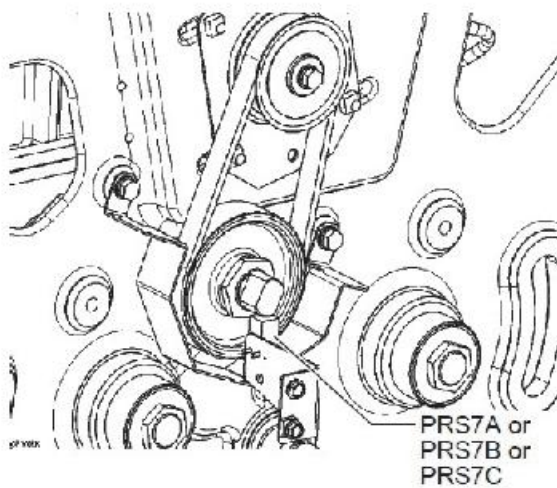
Adjusting range: 1.5 to 2.0 mm

(distance between sensor surface and shaft cylinder surface)

Sensor symbols are as follows:

- Three-head machine: PRS6A for MH, PRS6C for GE, and PRS6B for OE
- Two-head machine: PRS6A for GE and PRS6B for OE

4.1A.3 Adjustment of Proximity Switch Positions



- (4) Adjust the gap of each back roller rotation sensor.

Adjusting range: 1.5 to 2.0 mm
(distance between sensor surface and shaft
cylinder surface)

Sensor symbols are as follows:

- Three-head machine: PRS7A for MH, PRS7C for GE, and PRS7B for OE
- Two-head machine: PRS7A for GE and PRS7B for OE

NOTE: Be very careful since poor sensor position adjustment will cause stop of the frame with error [abnormal rpm] display due to erroneous rpm detection.

4.1A.4 Powering On and Check of Primary and Secondary Voltage Levels



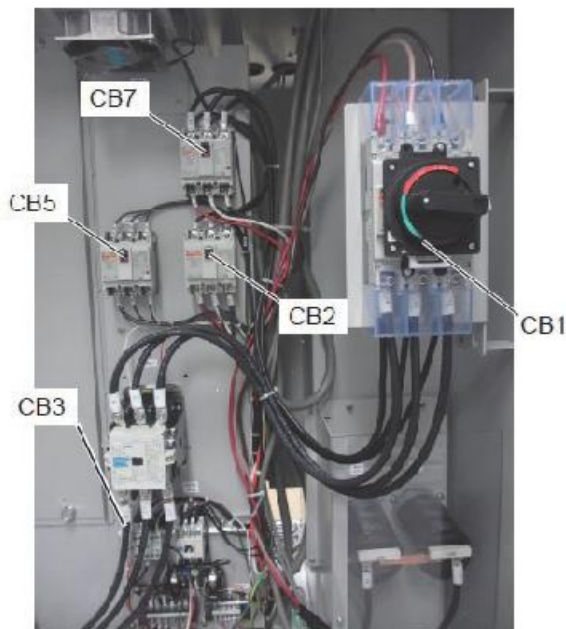
⚠ WARNING

Observe the safety rules given in

S.1 “Safe Work”

S.1.4 “Rules for Operating or Checking the Electrical Devices”

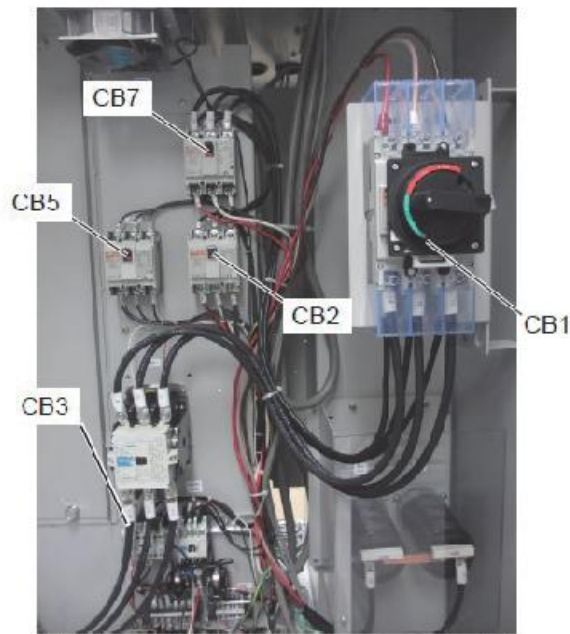
[1] Preparation



CB7 is mounted in the compact yarn model and the preparatory mode

- (1) Disconnect all motor wirings U, V and W at the LH side control box of OE.
- (2) Check that the primary voltage of main breaker CB1 is within the specified value $\pm 5\%$.

[2] Voltage Check Procedure



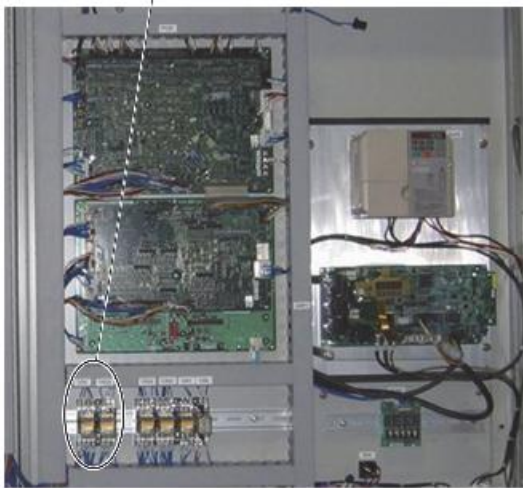
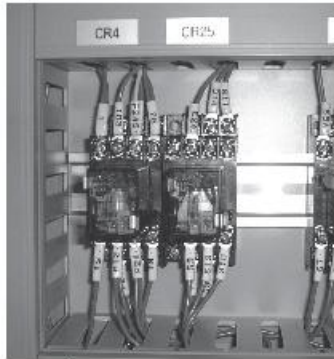
CB7 is mounted in the compact yarn model and the preparatory model

- (1) Check that the primary voltage of the CB1 is within the rated plant supply voltage $\pm 5\%$ by using a circuit tester.
- (2) Open the LH side control box of OE and turn on the circuit breaker CB2 on.
- (3) Turn the main circuit breaker CB1 on.
- (4) Check the output voltage of the 3-phase transformer TF1 in the LH side control box of OE.
 1. Check that the voltage is 210 VAC across terminals R5, S5 and T5.
 2. Check that the voltage is 100 VAC across terminals 3 and 2.
- (5) Check the secondary DC voltage of PCB2 in the RH side control box of OE.

	Voltage	Terminals
1	DC5 V	E5 $\leftrightarrow$ P5
2	DC12 V	E12 $\leftrightarrow$ P12
3	DC15 V	N15 $\leftrightarrow$ E15 E15 $\leftrightarrow$ P15
4	DC24 V	E24 $\leftrightarrow$ P24

- (6) Turn the main circuit breaker CB1 off.
- (7) In the LH side control box of OE;
 - Turn on the CB3 and CB5.
 - Turn on the CB7. (For the machine with compact yarn supported)
- (8) Turn the main circuit breaker CB1 on.
- (9) Check the secondary voltage of each circuit protector.
 1. Check that the voltage is 210 VAC across terminals R4A, S4A and T4A.
 2. Check that the voltage is 100 VAC across terminals 1 and 2.
 3. Check that the voltage is within the rated plant supply voltage $\pm 5\%$ across terminals R7, S7 and T7.
(For a compact yarn compatible model)

4.1A.5 Operational Check of Emergency Stop Buttons

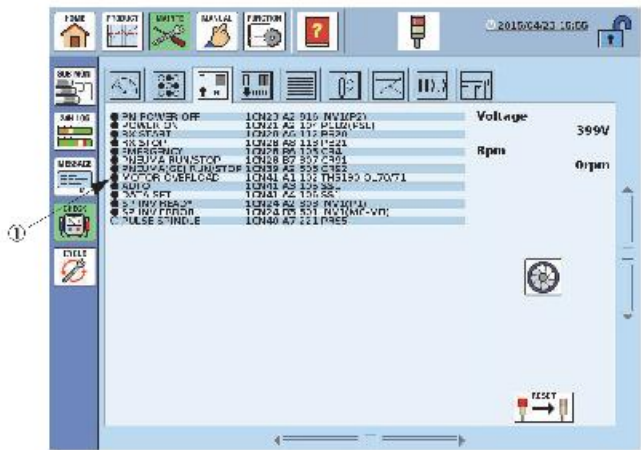


- (1) Close the door at two locations for MH (for 3-head version) so that the door switch will be on.
- (2) At the GE and OE, unlock the emergency stop buttons.
- (3) Press the RESET button, then check that the relay CR4 in the OE control box at the RH side comes ON.
- (4) If relay CR4 remains off, any of the door switches (LS1,2,3,4,5,8,9) is positioned incorrectly.
Adjust the position of the poorly positioned door switch.
- (5) Open and close each of these doors to check that each door switch clicks.

4.1A.6 Check of Motor Temperature Switch and Thermal Relay Operation

Check that the motor overload is ON on the I/O monitor.

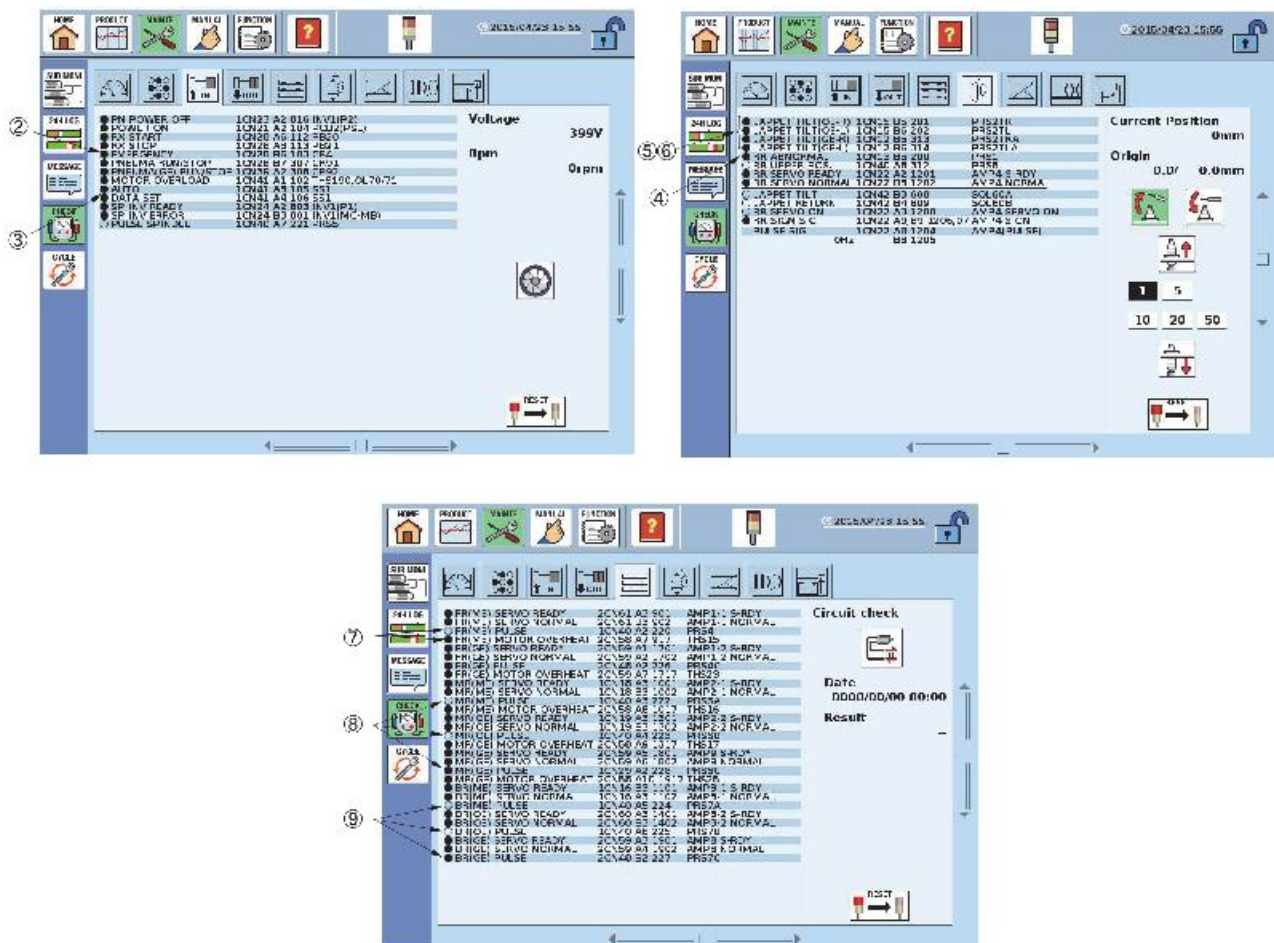
REFERENCE: If it is not ON, check whether each thermal relay operates.



Figures in the above illustration	Status indication	Location
①	Motor overload	OE

4.1A.7 Check of Sensors and Key Switches Input

(1) Check the I/O status of the sensors and switches on the I/O monitor of the operation panel.



Figures in the above illustration	Status indication	Location
②	CR4 (door switches and emergency stop button)	GE & OE & (MH)
③	3-position key switch (automatic, manual, and setting-enable positions)	OE
④	Ring rail up/down overrun (PRS1)	OE or (MH)
⑤	Lappet tilt check (PRS2TR, 2TRA)	OE & (GE)
⑥	Lappet tilt check (PRS2TL, 2TLA)	OE & (GE)
⑦	Front roller speed detection (PRS4, 4C)	GE & (MH)
⑧	ミドルローラ回転検知 (PRS6A, 6B, 6C)	GE & (OE) & (MH)
⑨	Back roller speed detection (PRS7A, 7B, 7C)	GE & (OE) & (MH)

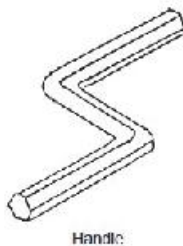
4.1A.8 Check of Load by Ring Rail Up/Down Handle

⚠ WARNING

Never attempt to move the ring rail up or down by using the ring rail up/down handle when the lappets are in the tilted position.

⚠ CAUTION

When you operate the handle with the power being off, the set zero point of the ring rail shifts. When you have operated the handle, set the zero point again.



Handle:

- (1) Check that all pieces of the ring rail are mounted.

NOTE: When you operate the handle with no ring rail mounted, relevant parts may be damaged.

Make sure to mount rail rings.

- (2) Insert the ring rail up/down handle to the lifting gear box in the OE (For three-head machines, insert the handle in the MH.) and turn it clockwise.

(The ring rail will move up.)

NOTE: Whenever you feel any abnormal resistance, stop turning the ring rail up/down handle and check whether the ring rail interferes with any obstacle.

- (3) Listed below are torque and load required for moving up the ring rail by the handle.

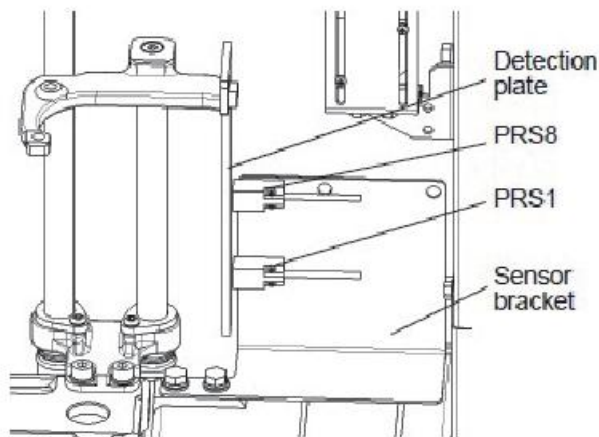
Number of spindles	Shaft torque (N·m)	Handle load	
		(N)	(kgf)
480	3.92 ~ 5.41	35.4	3.6
624	5.24 ~ 6.89	45.4	4.6
816	7.01 ~ 8.87	58.8	6
1008	8.77 ~ 10.8	72.1	7.4
1200	10.5 ~ 12.8	85.5	8.7
1440	12.7 ~ 15.3	102.2	10.4
1632	14.5 ~ 17.3	115.6	11.8
1824	16.3 ~ 19.3	129	13.2

Turn the handle and check that the ring rail moves up with the values above or below.

4.1A.9 Adjustments of Ring Rail-Related Sensors

Use the handle to move the ring rail up or down for adjustment.

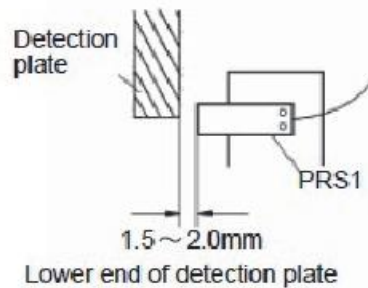
[1] Adjusting the Gaps between Sensor (PRS1, PRS8) and Detection Plate



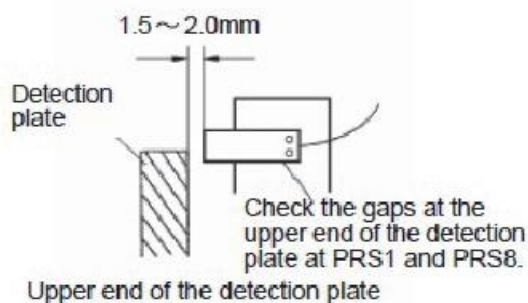
- (1) Adjust the sensor bracket and the detection plate so that the gap between the sensors and the detection plate become 1.5 to 2.0 mm for upper and lower ends of the detection plate.

NOTE: Adjust accurately since if the gap between the sensors and the detection plate is insufficient, [2] (4) would be difficult to be checked.

Adjustment range: 1.5 to 2.0 mm

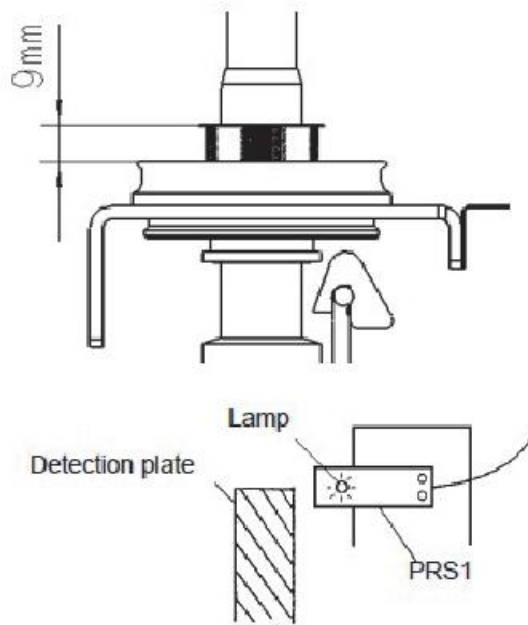


Lower end of detection plate



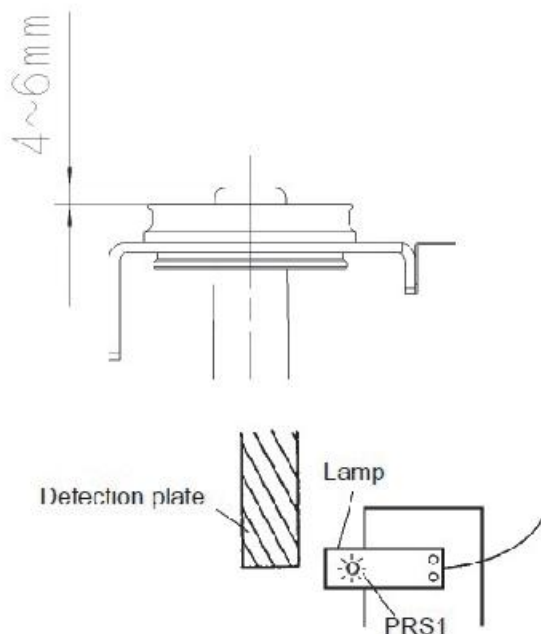
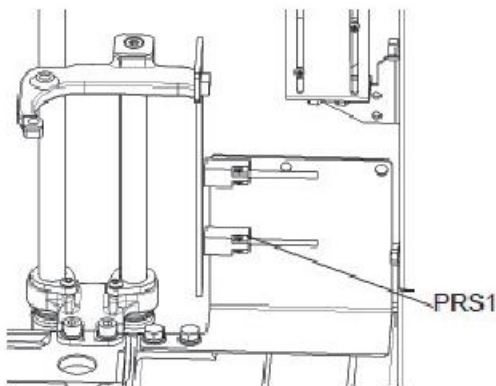
Upper end of the detection plate

[2] Adjusting the Ring Rail Safety Sensor(PRS1)



- (1) Adjust the ring rail so that the ring upper surface comes to 9 mm lower than the cutter blade upper surface.
- (2) Loosen the fixing bolt of the detection plate, move the detection plate down to the position where the lamp on the sensor (PRS1) goes off (the red lamp turns off), and fix the detection plate at the position.
- (3) Move the ring rail up to the position where the sensor turns on. Move down the ring rail and check that the position where the sensor turns off is that position (9 mm) shown in the figure

NOTE: The above adjustments are very important, so repeat these steps three times.



- (4) Next, lift up the ring rail to check that the lamp goes off (the red lamp turns off) when the ring upper surface is 4 to 6 mm lower than the top end of the bobbins.

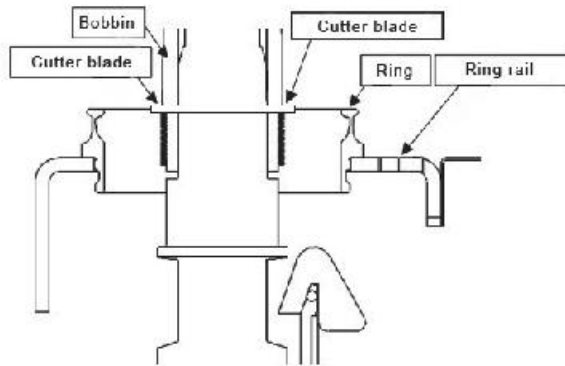
4.1A.10 Zero Point Setting of the Ring Rail



⚠ CAUTION

- Before moving the ring rail, be sure to give signals to co-workers and confirm them.
- Check that no tools, parts, or other obstacles lie on the ring rail travel path beforehand.
- After setting the zero point of the ring rail, do not move the ring rail with the ring rail up/down handle when the power is off (as described in Subsection 4.1A.8). If you do so, you need to set the zero point again.

REFERENCE: It is necessary to set the zero point of the ring rail at the time of installation, but not necessary after that.

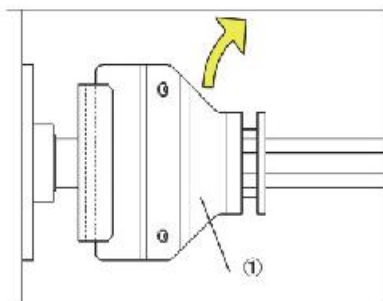


- (1) Make sure that the ring rail-related sensors (PRS8 and PRS1) have been adjusted as described in Subsection 4.1A.9.
- (2) Move the ring rail with the ring rail up/down handle so that the top of the rings becomes aligned with that of the cutter blade.
- (3) Check the alignment of the rings with the cutter blade at the RH and LH sides of the GE and OE each.
- (4) Perform the zero point setting operation on the operation panel. (Refer to Section 7.1A, Subsection 7.1A.10 [4])

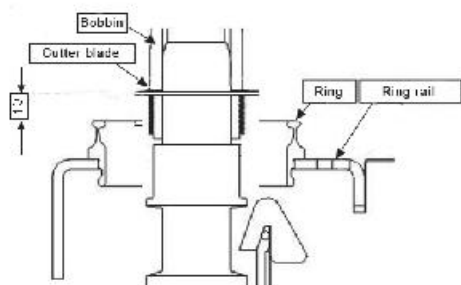
4.1A.11 Lappet Tilt/Return Adjustment

WARNING

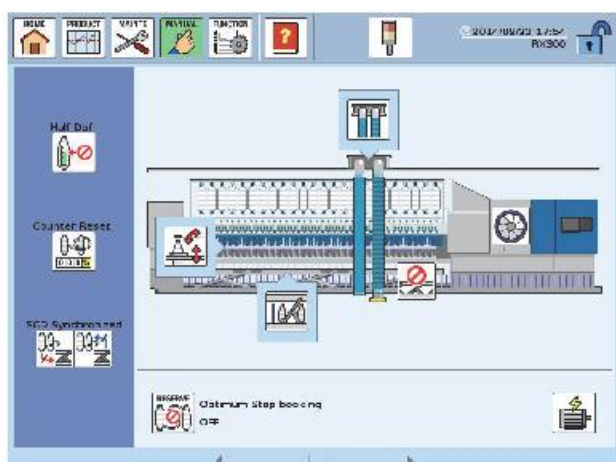
Never attempt to move the ring rail up or down by using the manual handle when the lappets are in the tilted position.



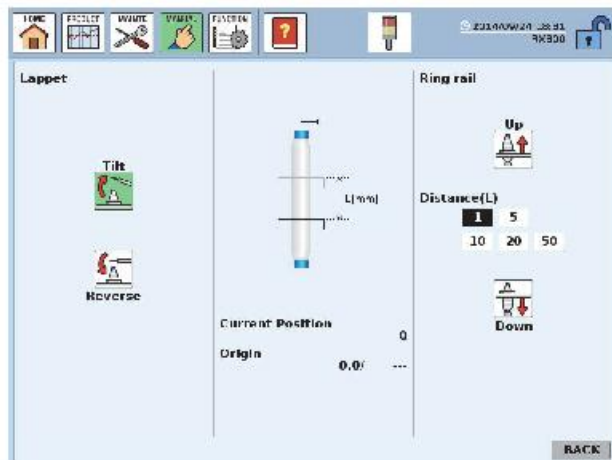
(1) Disconnect lappet tilting plate ①.



(2) Move the ring rail to a point the upper surface of ring is 10 mm above the cutter blade upper surface.

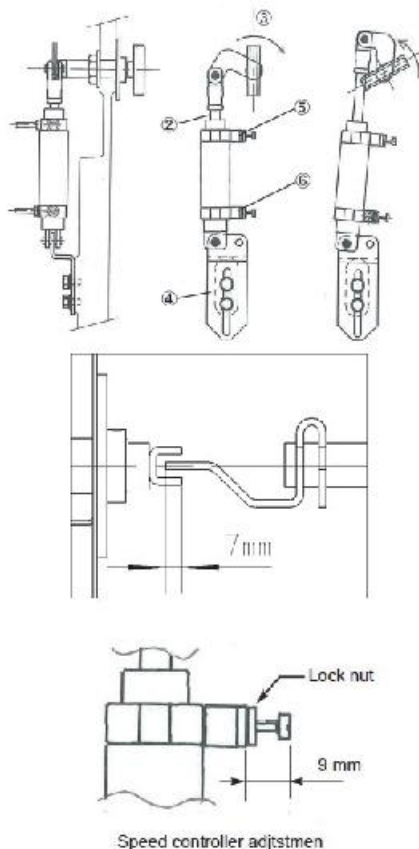


(3) The screen shown at left appears upon touching the [MANUAL] switch. Touch the Lappet Ring rail switch.

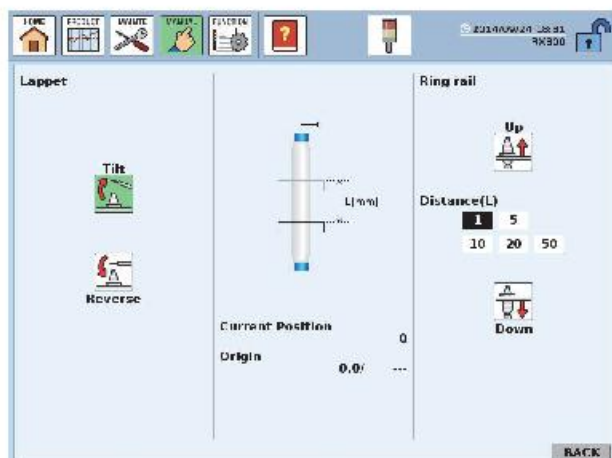


- (4) Touch the Reverse switch to reset the lappet. The sensor (PRS2R2) ⑦ will go off.

NOTE: Lappets cannot be tilted when the ring rail is 50 mm or more away from the home position (for protection of the tilting unit).

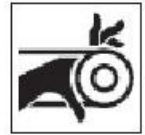


- (5) Tighten the air cylinder bracket ④ so that the groove of the tilting shaft ③ becomes vertical. (The fixed position is adjusted at the time of shipment.)
- (6) Secure speed controllers ⑤, ⑥ with a locknut by adjusting as shown in the figure.
- (7) Connect lappet tilting plate ①. Check that lappet tilting plate is inserted 7 mm or more into the groove in tilt shaft ③. Perform (5) through (7) at the RH and LH sides, respectively.



- (8) On the Manual Switch screen, touch the Tilt switch to turn up the lappets into the tilted position. At this time, check that the sensors (PRS 2TR, 2TL) are ON.

4.1A.12 Check of Main and Pneumatic Motor Turning Directions



⚠ CAUTION

- Remove the main motor belt beforehand.
- Before starting the job, be sure to give signals to co-workers and confirm them.



Main motor



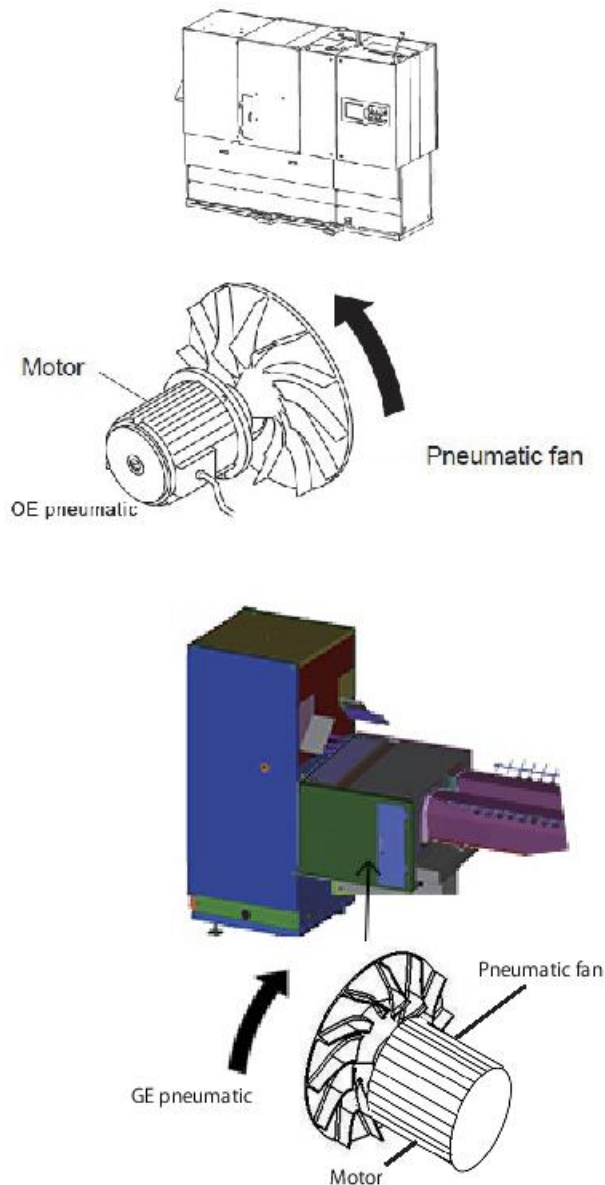
- (1) Check the main motor turning direction.

If an error message appears on the operation panel, take the necessary action according to the message.

For the error message removing procedure, refer to Section 9.1, "Troubleshooting."

1. Turn the main motor with individual operation to check the motor turning direction. Speed: 100 rpm
2. Turning direction by specification

Spindle tape tension	Single	Double
twist		
Z twist	Direction A	Direction B
S twist (reverse twist)	-	Direction A



(2) Start and stop the machine manually to check the turning direction of the pneumatic fan which is turning due to inertia.

1. OE pneumatic

- Check the turning direction of the fan from the bottom of the pneumatic box.
- On the bottom of the box is an arrow mark indicating the regular rotational direction.
- The pneumatic fan should rotate counterclockwise when viewed from the motor side.

2. GE pneumatic

- Open the side cover of the pneumatic box RH side to check the turning direction of the fan.
- Within the box is an arrow mark indicating the regular turning direction.
- The pneumatic fan should turn clockwise when viewed from the motor side.

4.1A.13 Main Motor Belt Adjustment



CAUTION

Observe the safety rules given in

- S.1 “Safe Work”
- S.1.2 “Rules for Safe Operation”
- S.1.3 “Rules for Maintenance”

A belt should be checked when one operation day elapses, when one operation month elapses, and when every three months elapses after a new belt is attached.

The belt life is as follows.

About one year (72202-17601-**, belt width 110 mm)

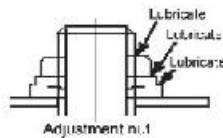
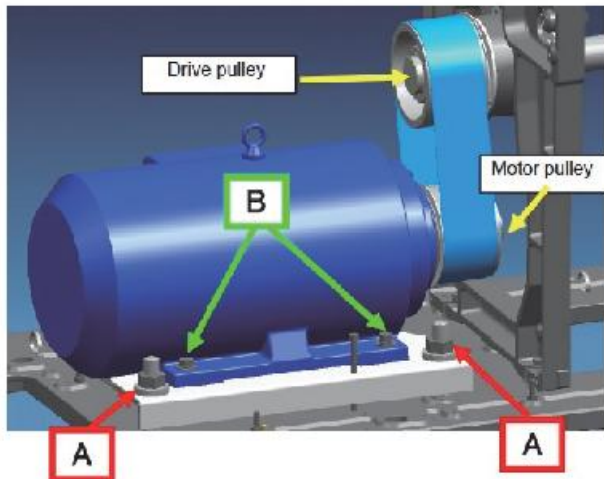
About eight months (72202-96601-**, belt width 85 mm)

NOTE: Use only the designated belt. Note that the use of other belts can shorten the motor life and increase power consumption.

[1] Tension adjustment

Main motor belt adjustment should be made for cases below.

- On installation after delivery
- On replacement with a new belt
- When the tension value is outside of the setting range (1900 to 2400 N) on regular check (in the cycle above)

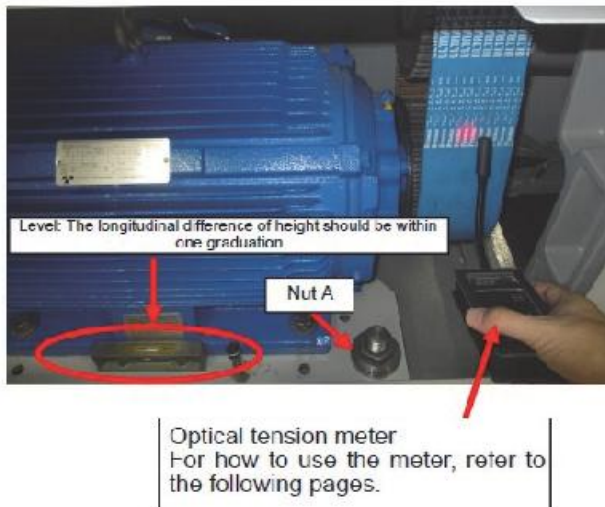


- (1) Energy-saving motor type belt tension adjustment Adjust the main motor position so that the motor pulley is parallel to the drive pulley, and adjust the tension of the belt.

1. Adjustment procedure

- ① Loosen the adjustment nuts (A) (two pcs.) to loosen the belt tension. Loosen the motor fixing bolts (B) (four pcs.). Lubricate the screws and spherical washers of the adjustment nuts (A). Also lubricate the underside of the motor base.
- ② Adjust the motor position keeping the levelness in the axis direction to position the motor pulley to meet the drive pulley position. Use a dedicate tool to adjust the motor position.
- ③ Tighten the motor fixing bolts (B) (four pcs.).

4.1A.13 Main Motor Belt Adjustment



- ④ Adjust the nuts (A) keeping the levelness in the axis direction with a level to tighten the belt to the optimal tension described in the table.

The levelness of the motor base should be within one graduation of the level. Measure the tension with a dedicated tension meter.

The optimal tension and measurement method are as follows.

2. Main motor belt tension

Note that the optimal values are different in the first time (with a new belt) and from the second time when you tighten the belt.

- a. First time (with a new belt): 2400 - 2600 N
- b. From the second time: 1900 - 2100 N

The set frequencies are shown in Tables 1 to 4

- ① First time (with a new belt): 2400 - 2600 N

Circumference of belt: 1176mm

Table 1 Frequency of predetermined tension (new belt, 1176 mm)

		Number of teeth of drive pulley				
		38T	42T	46T	50T	56T
Number of teeth of motor pulley	38T	/	83 ~ 86	87 ~ 91	91 ~ 95	100 ~ 104
	42T	83 ~ 86	/	91 ~ 95	/	105 ~ 109
	46T	/	91 ~ 95	96 ~ 100	101 ~ 105	/
	50T	/	/	101 ~ 105	/	/

Unit: Hz

- ② First time (with a new belt): 2400 - 2600 N

Circumference of belt: 1246mm

Table 2 Frequency of predetermined tension (new belt, 1246 mm)

		Number of teeth of drive pulley				
		38T	42T	46T	50T	56T
Number of teeth of motor pulley	38T	/	/	/	81 ~ 84	88 ~ 91
	42T	/	/	81 ~ 84	85 ~ 88	/
	46T	/	81 ~ 84	84 ~ 88	/	/
	50T	/	/	/	/	/

Unit: Hz

- ③ From the second time: 1900 - 2100N

Circumference of belt: 1176mm

Table 3 Frequency of predetermined tension (from the second time, 1176 mm)

		Number of teeth of drive pulley				
		38T	42T	46T	50T	56T
Number of teeth of motor pulley	38T	/	74 ~ 78	77 ~ 81	81 ~ 85	89 ~ 93
	42T	74 ~ 78	/	81 ~ 85	/	78 ~ 82
	46T	/	81 ~ 85	85 ~ 90	90 ~ 95	/
	50T	/	/	90 ~ 95	/	/

Unit: Hz

- ④ From the second time: 1900 - 2100N

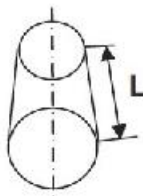
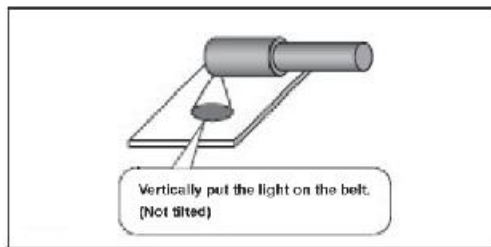
Circumference of belt: 1246mm

Table 4 Frequency of predetermined tension (from the second time, 1246 mm)

		Number of teeth of drive pulley				
		38T	42T	46T	50T	56T
Number of teeth of motor pulley	38T	/	/	/	72 ~ 76	78 ~ 82
	42T	/	/	72 ~ 76	76 ~ 79	/
	46T	/	72 ~ 76	75 ~ 79	/	/
	50T	/	/	/	/	/

Unit: Hz

NOTE: Note that the improper belt tension can shorten the belt life and increase power consumption.



3. How to use the tension meter

Gauge to Use

77135-00028-** METER,TENSION

Measurement method

- ① Press the Power button (1) to turn the gauge on.
- ② When "0000" appears on the LCD screen (2), measurement preparation is complete.
- ③ Bring the head (3) close to the measurement point and emit target light to it.
 - At this time, keep a distance of 2 cm or less between the belt and the head so that the light is emitted at right angles to the belt.
- ④ Vibrate the belt.
 - Tap the belt with something appropriate.
- ⑤ When the tension measurement has been successful, a sound is made and the vibration frequency of the belt appears on the LCD screen (2).
 - Carry out the measurement three times and treat the average value as measurement value.
- ⑥ Adjust the vibration frequency so that it is within a set range according to the Tables 1 to 4 (frequency of predetermined tension) in the previous page.

Reference :

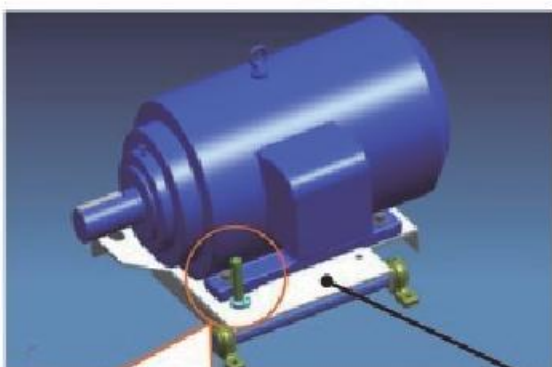
Belt tension[N]= 4 x unit mass[g/m x mm]
 x belt width[mm] x span length[mm])²
 x belt vibration frequency[Hz])² x 10⁻⁹

4. How to use the motor position adjustment tool

Tools in use

Tool No.: R8207-21010-**

Tool Name: TOOL-COMPL, MAIN MOTOR POSITION

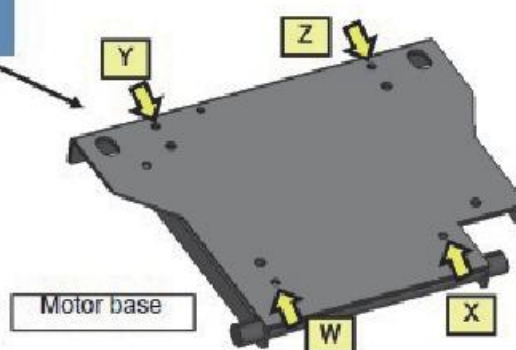


[Adjustment method]

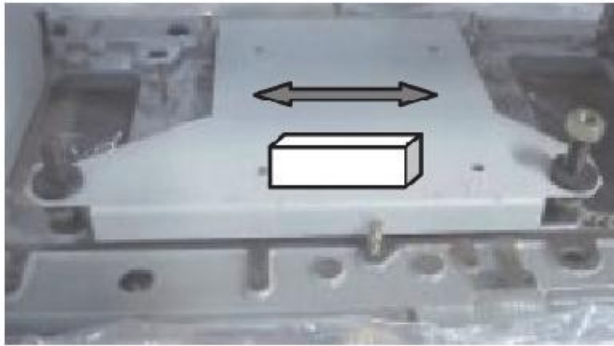
1. Insert the tool in the motor base as shown in the left figure. There are four tool insertion holes near the motor (W to Z in the figure below). Select one according to the direction in which you want to move the motor.
2. Rotate the tool with an open-ended wrench, press it to the motor leg, and move the motor.



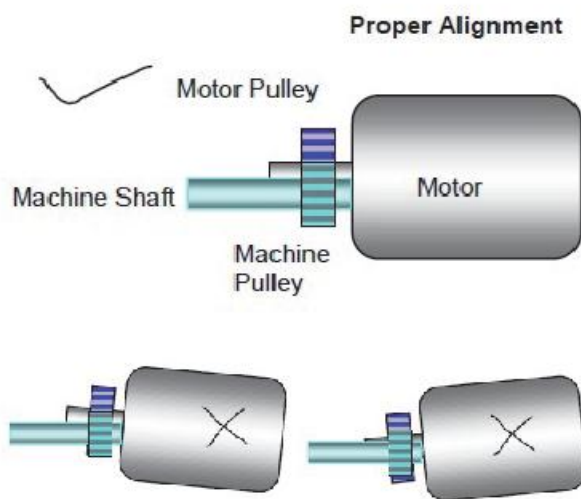
Motor position adjustment tool



(2) Induction motor type belt tension adjustment



Level motor base within 0.5 mm /m using Spirit level in the direction shown

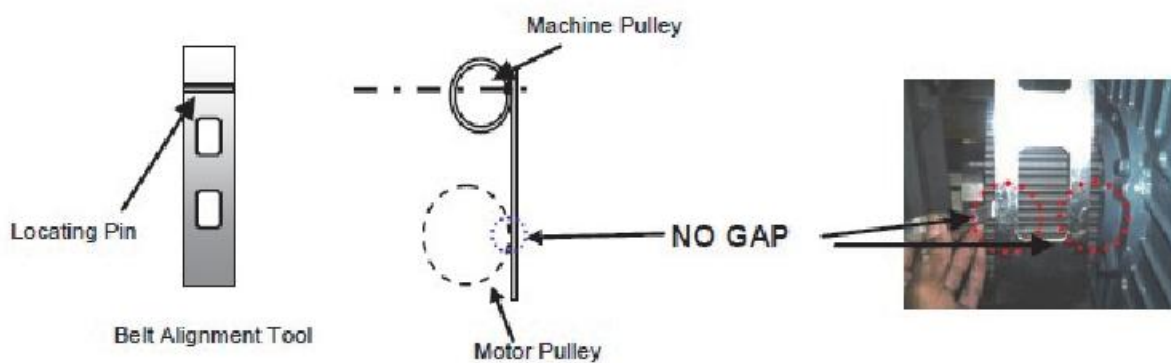


1. Pulley Alignment

Both machine and motor pulley alignment is essential for longer timer belt life.

Check the alignment of Motor Pulley with Machine Pulley as explained below.

- ① If the motor pulley is not aligned with machine pulley, swivel the motor and check the alignment.
- ② For checking alignment, use belt alignment tool.
- ③ Locate the pin present on the tool to the machine pulley.
- ④ Check the motor pulley contact to belt alignment tool width wise by checking gap between motor pulley & tool on either side of the tool.
- ⑤ Swivel the motor, if required to make uniform contact.



2. Belt tension

Adjust the belt tension to obtain a frequency suitable for your machine specification as specified in Table 1. (For how to use the tension meter, refer to Subsection 4.1A.13 3. “How to Use the Tension Meter.”) Note that the optimal values are different in the first time (with a new belt) and from the second time when you tighten the belt. Be sure to note down the frequency before removing the belt for, for example, a periodic inspection. When reinstalling the belt, adjust the tension within the range of $\pm 2\%$ of the frequency obtained before removing the belt.

Table 1 Frequencies for various conditions

Motor [kW]	Twist direction	Lift length	Drive pulley	Motor pulley	Frequency in the 1st time [Hz]		
37	SZ specification	6"-8"	32T	44T	96	~	106
			36T	40T	99	~	110
			40T	36T	101	~	112
			44T	32T	112	~	124
	Z	6"	32T	44T	80	~	88
			36T	40T	83	~	92
			40T	36T	85	~	94
			44T	32T	93	~	103
		7"-8"	34T	47T	83	~	92
			39T	43T	87	~	96
			43T	39T	89	~	98
			47T	34T	98	~	108
45	SZ specification	6"-8"	32T	44T	105	~	117
			36T	40T	110	~	121
			40T	36T	112	~	123
			44T	32T	124	~	137
	Z	6"	32T	44T	88	~	97
			36T	40T	92	~	101
			40T	36T	93	~	103
			44T	32T	103	~	114
		7"-8"	34T	47T	92	~	101
			39T	43T	96	~	106
			43T	39T	98	~	108
			47T	34T	108	~	119
55	SZ specification	6"-8"	32T	44T	117	~	129
			36T	40T	121	~	134
			40T	36T	123	~	136
			44T	32T	135	~	149
	Z	6"	32T	44T	97	~	107
			36T	40T	101	~	112
			40T	36T	103	~	114
			44T	32T	112	~	124
		7"-8"	34T	47T	101	~	112
			39T	43T	106	~	117
			43T	39T	108	~	120
			47T	34T	119	~	131
65	SZ specification	6"-8"	32T	44T	125	~	138
			36T	40T	129	~	143
			40T	36T	132	~	146
			44T	32T	144	~	159
	Z	6"	32T	44T	104	~	115
			36T	40T	108	~	120
			40T	36T	110	~	122
			44T	32T	120	~	132
		7"-8"	34T	47T	110	~	122
			39T	43T	115	~	127
			43T	39T	118	~	130
			47T	34T	127	~	141
75	SZ specification	6"-8"	32T	44T	131	~	145
			36T	40T	137	~	151
			40T	36T	139	~	154
			44T	32T	155	~	171
	Z	6"	32T	44T	109	~	121
			36T	40T	114	~	126
			40T	36T	117	~	129
			44T	32T	129	~	142
		7"-8"	34T	47T	116	~	129
			39T	43T	122	~	135
			43T	39T	125	~	138
			47T	34T	134	~	148

NOTE: Note that the improper belt tension can shorten the belt life and increase power consumption.

[2] Belt traveling adjustment

Main motor belt traveling adjustment should be made for cases below.

- On installation after delivery
- On replacement with a new belt
- When a traveling error is found in regular check
- When a tension adjustment is made in regular check

NOTE:

Check for danger because when the main motor runs, the spindle and draft roller rotate.

- The spindle tape should be securely mounted. • Nothing should attach to the spindle tape and the spindle.
- Apply pressure to the weighting arm for two places on one side of one block to prevent roller dropping.
- Before starting the job, be sure to give signals to co-workers and confirm them.

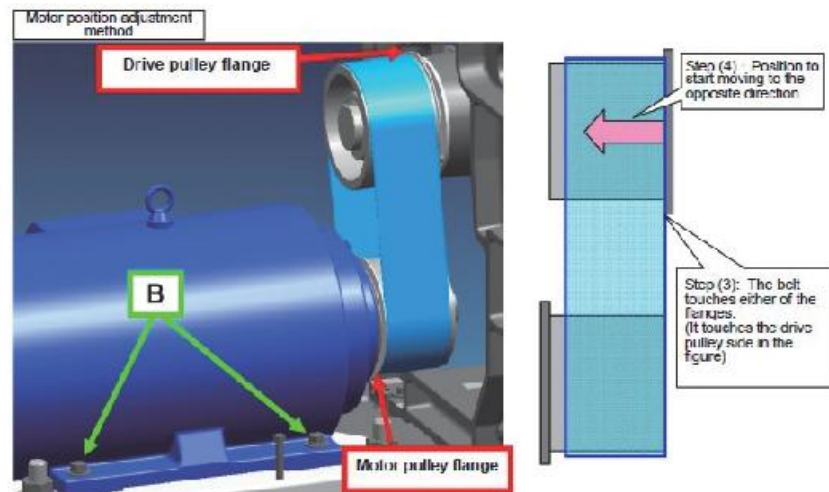
NOTE:

The timing belt **inevitably contacts** either the motor pulley flange or the drive pulley flange. This is not a problem, however, it is important to check for any abnormality caused by strong contact.

[2.1] Energy-saving motor type belt traveling adjustment

(1) Adjustment procedure

1. Loosen the motor fixing bolts B (four pcs.) slightly so that the motor can be moved with a jig
2. Rotate at a spindle speed of 1000 rpm (ultra-low speed).
3. The belt touches either the flange of the motor pulley or the flange of the drive pulley.
4. Move the motor with the motor position adjustment tool in the figure below to find the position where the belt leaves the flange to move to the opposite direction. If possible, set it to a position where the belt does not touch either of the flanges (possible at 1000 rpm).
5. Run also at 3000 rpm and 10000 rpm to check the contact state with the flanges and adjust as in the case of 1000 rpm.
6. After the position is decided, tighten the bolts B (four pcs.)

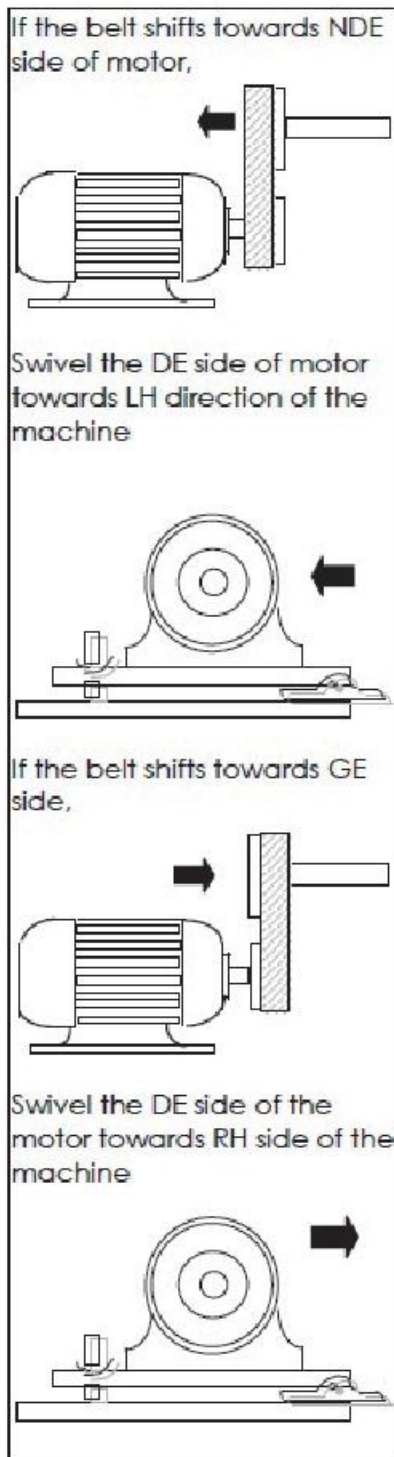


(2) Check of operation

Run the RX again and check that a disengagement of the spindle tape does not occur and also abrasion powder, smoke, dust or noise is not generated due to the main motor belt and the flange rubbing against each other hard.

If any of the above problems occurs to the belt, readjust the motor position or the tilt of the motor base to eliminate the problem.

[2.2] Induction motor type belt traveling adjustment



(1) Adjustment procedure

- ① Run the machine.
- ② Align the motor by swiveling and if required adjust the pulleys so that the belt runs in the center of pulleys. It is acceptable if the edge of the belt is just touching one of the pulley flanges. Ensure that belt does not press against the flange of machine pulley or come out of the motor pulley.
- ③ Check the level of the base again.
- ④ Lock both the nuts
- ⑤ Run the machine
- ⑥ Observe for the belt running in the center of both the pulleys.
- ⑦ If the belt is found moving away from the center of the pulley, loosen the belt; adjust the motor position slightly by using the motor position adjustment tool as shown in the figure.
- ⑧ After adjusting the motor position, lock the motor and fix the belt as per procedure explained before.
- ⑨ Fine adjustment of maximum one thread adjustment may be made on the motor base nuts to center the belt.
- ⑩ Check the tension again and adjust if required.

⚠ CAUTION

Exceeding the recommended belt tension will result in reduced belt and bearing life and increased power consumption.

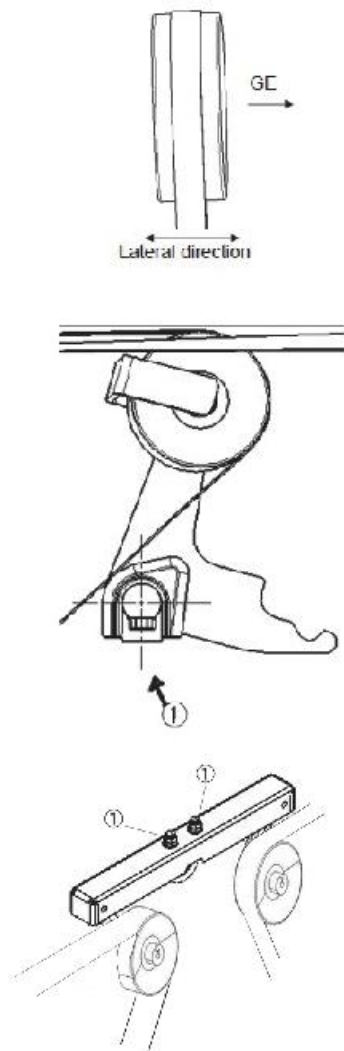
4.1A.14 Spindle Tape Adjustment



⚠ CAUTION

Observe the safety rules given in

- S.1 "Safe Work"
- S.1.2 "Rules for Safe Operation"
- S.1.3 "Rules for Maintenance"



- (1) Run the RX and check and record that the tape runs at the center of the tension pulley.
- (2) Stop the RX and adjust the faulty tension devices by moving them to the right or left as shown at left.
 1. Loosen the screw ①
 2. Slightly move the pulley in the direction tape is deviated.
 3. Firmly tighten set screw ①.
- (3) Set the spindle speed to about 80% the full speed, activate the frame and check the tape running condition.
For spindle speed setting procedure, refer to Section 7.1 "Operation Panel."
- (4) Also check for abnormal noise caused by insufficient lubrication of the spindle bolster and loose nuts.

4.1A.15 Adjustment of Actual Spindle Speed



(1) Adjustment of Indicated and Actual Spindle Speeds

1. Ensure the safety and then press the Start switch to run the RX.
2. Measure the actual spindle speed.
3. If the spindle speed displayed on the operating panel is different from the actual speed, input the percentage (%) of the correction amount. Refer to Subsection 7.1A.10 for details.



4.1A.16 Draft Roller Drive System Timing Belt Adjustment and Maintenance

NOTE: The tension at the time of shipment is low for protection of the timing belt and bearing.

Set the initial tension according to the method below.

Improper belt tension may cause defects, such as belt teeth skipping, early wear due to abnormal vibration, and bearing fault.

In addition, the tension may slightly decrease due to initial timing belt elongation after the belt operation, but this does not mean the belt is abnormal. Do not tighten the belt again.

[1] Initial Tension Setting

Set the initial tension as follows before trial running.

(Be sure to turn the power off before trial running.)

[1.1] Front roller drive system (GE, MH)

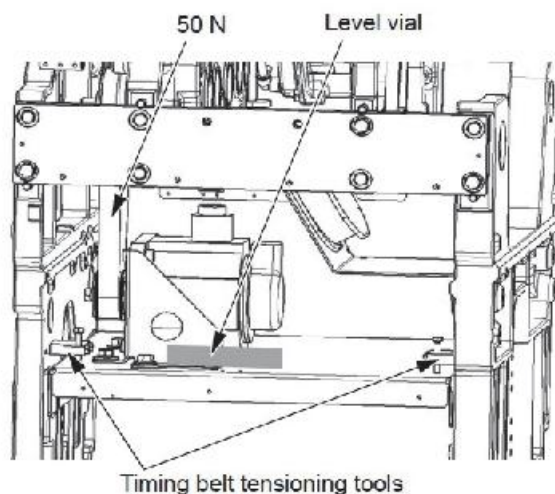


Fig: Front Roller Drive System Timing Belt Tensioning Tool and Tension Check

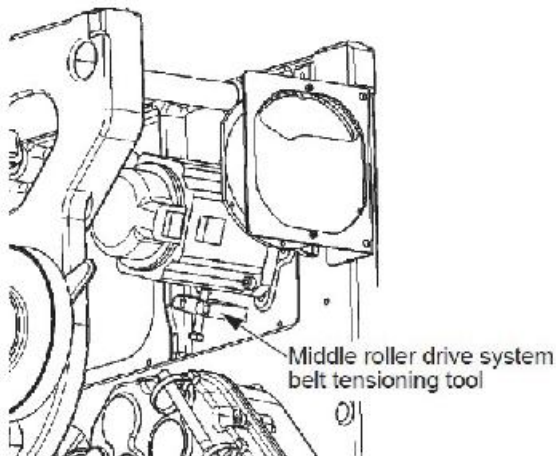
Install the belt tensioning tools on the inside frame, force the motor base down, and tighten the belt to the optimum tension.

The motor base should be leveled to less than one graduation with the level vial.

(One graduation on level vial = 0.5 mm/1 m)

Measure the set tension for the initial tension by Section [1.3].

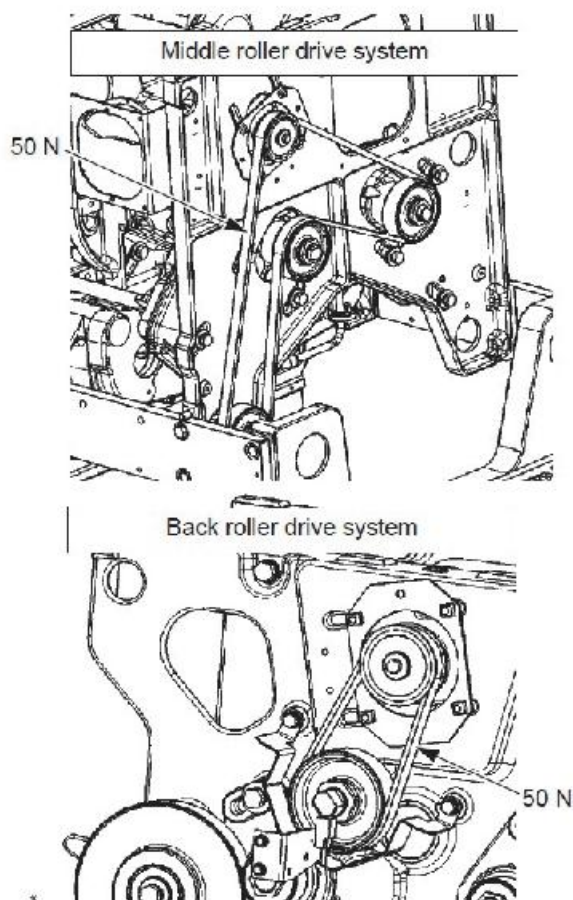
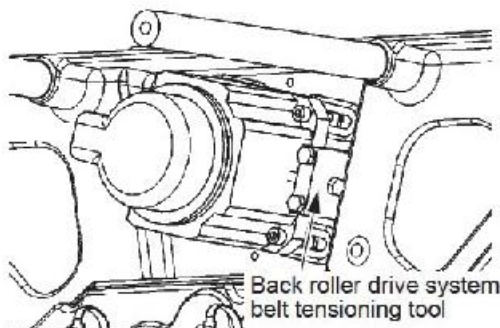
[1.2] Middle and back roller drive systems(GE, OE, MH)



Install the belt tensioning tools on the inside and outside gearing stands and push the motor up.

Set the initial belt tension for a belt flexure: d of the value shown in the table below when a load of 50 N is applied to the center of the belt.

After having driven the roller, visually check if the belt is running in an abnormal state.



[1.3] Confirmation of Belt Tension with a Optical Belt Tension Meter

The table below shows the tension value and specifications of each belt when an optical tension meter is used.

(For how to use the tension meter, see [How to Use a Tension Meter] in [4.1A.13 Adjustment of the Main Motor Belt Running].)

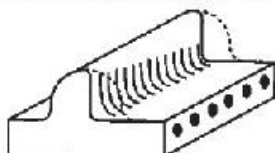
	Vibration frequency [N]	Vibration Frequency [Hz]	Belt Specification		
			Unit Mass [g/mm×m]	Width [mm]	Span [mm]
Fr motor belt	275 to 410	69 to 84	5.2	30.0	305
Md motor belt	140 to 220	35 to 43	4.3	25.0	520
Bk motor belt	140 to 220	121 to 150	4.3	25.0	150

[2] Maintenance

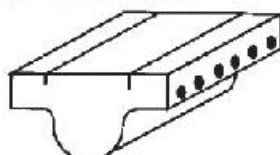
■ Belt and pulley replacement guideline

Replace the belt and pulley when they are found in the status as shown below.

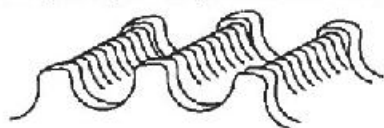
- Worn belt teeth (about half of tooth width)



- Crack on belt rear side



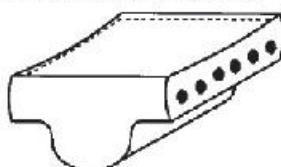
- Worn pulley teeth (about 0.3 to 0.8 mm)



- Crack at belt teeth root



- Belt swelling by oil adhesion



Inspect the RX s shown below after turning the frame power off.

Inspect the belt and pulleys visually at the time of regular inspection (every three months).

Replace them as early as possible when any of the conditions at left is found.

Please bear in mind that the belt life may be shortened to one year or less (five years or less for the pulley) depending on the spinning conditions. During a regular inspection, clean the pulley teeth and the belt using a brush or the like.

4.1A.17 Check of Doffing Midway and Restart of Ring Rail

Check parameter settings relating to lifting operation (standard values are as listed in the table below).

Parameter setting for winding end/start operation
(reference values for cotton 100%, Ne40 spinning)

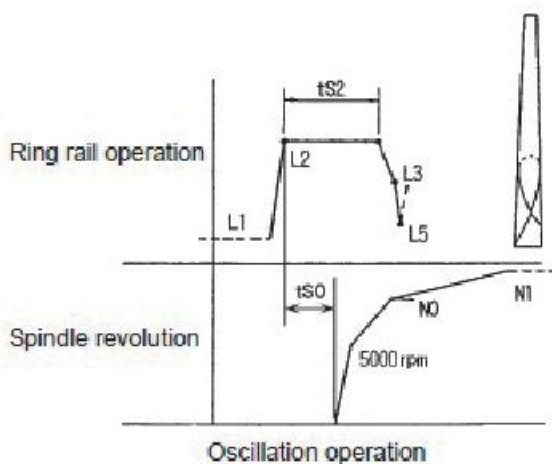
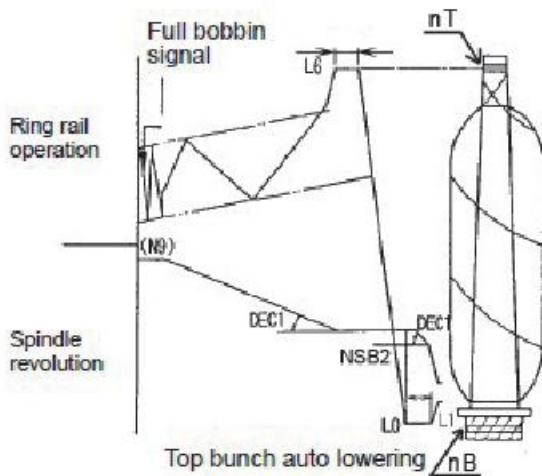
Set value	Code	Setting item
-8	L0	Bottom bunch position
10	L1	Primary lift position
70	L2	Oscillation, secondary lift position
40	L3	Oscillation, lowering speed change-over position
10	L5	Winding start position
200 (bobbin length – 10 mm)	L6	Top bunch position
1200	NSB2	Spindle speed at the start of full-bobbin brake
0.4 to 1.0	tS0	Oscillation, spindle start time
0.6	tS2	Oscillation, primary lowering time
0	nB	Number of bottom bunch windings
0	nT	Number of top bunch windings
0	ADW	Number of cop windings

■ Operation

CAUTION

Check the lappet angle and its periphery for foreign matter, tools or other obstacles before activating up/down operation.

4.1A.17 Check of Doffing Midway and Restart of Ring Rail



- (1) Move the ring rail to the bobbin intermediate position.
- (2) After confirmation of safety, activate the frame and check the following items:
 1. Check for vibration, noise and heat generation inside the GE.
 2. Check the ring rail and lappet for abnormal up/down movements.
- (3) Press the doffing midway switch on the [MANUAL] touch screen to check the following items:
 1. Check if the top bunch position is correct.
 2. Check if the bottom bunch position is correct.
 3. Check if the primary lift position is correct.
 4. Check if the stopping timing is correct.
 5. Check if the lappet tilting is conducted correctly.
- (4) Reset the counter. For the resetting procedure, refer to Section 5.1A "Operation".
- (5) After confirmation of safety, press Start button to activate the frame again to check the following items:
 1. Check if the lappet returns correctly.
 2. Check if the secondary lift height is correct.
 3. Check if the start timing is correct.
 4. Check if the winding start position is correct.
- (6) Repeat steps (3) to (5) five times.

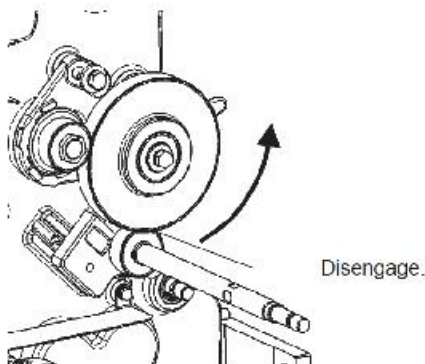
4.1A.18 Inspection on Back Bottom Roller and Neck Bearings

[1] Check of Loose Back bottom roller Bolts

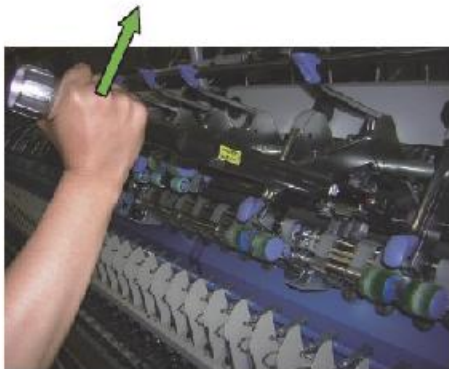
Since the screwed portion of the back bottom roller may become loosened, disconnect the roller drive joint portion on initial operation and regular maintenance (every three months) and check any loosening.

CAUTION

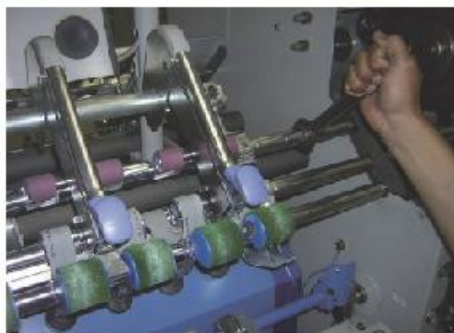
1. Weighting using the weighting arm should be limited to one position per block. However, apply weight to two staffs of the roller both ends to prevent roller uplift on torque check.
2. Be careful on turning directions when screws are tightened since the right screws are used for the back bottom roller GE, MH/RH side, and OE/LH side and the left screws are used for GE, MH/LH side, and OE/RH side. (Always turn the torque wrench in the direction opposite to the roller rotating direction.)



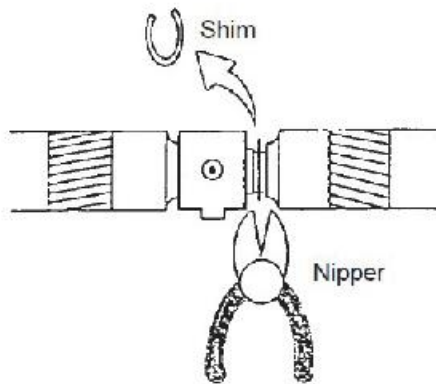
- (1) Disengage the back roller lever bracket, and keep the roller at the open end.



- (2) Apply a roller-tightening torque wrench to the roller tip end and set a wrench to the parallel portion (width across flats: 22 mm) of the driving roller shaft and turn them in the roller tightening direction to check the torque values.



[2] Check of Overall Bottom Roller Length



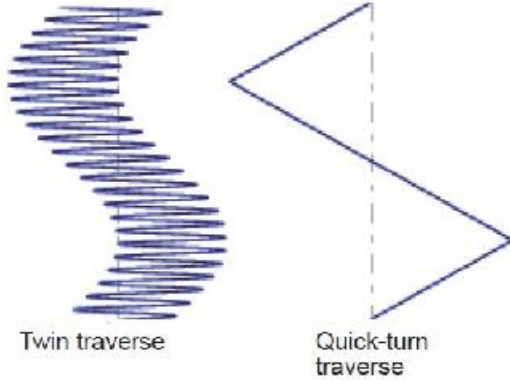
Heat generated by rotation of the neck bearings causes thermal expansion of the bottom roller during initial operation, resulting in increase of roller overall length by 1 to 2 mm (for multiple spindle models). It is, therefore, required to inspect the neck bearing position during operation.

ADJUSTMENT: Reduce the required number of shims, which were installed to adjust the overall length during assembly.

4.1A.19 Quick-turn Traverse Distance Setting

[1] Quick-turn Traverse Motion

Traverse motion



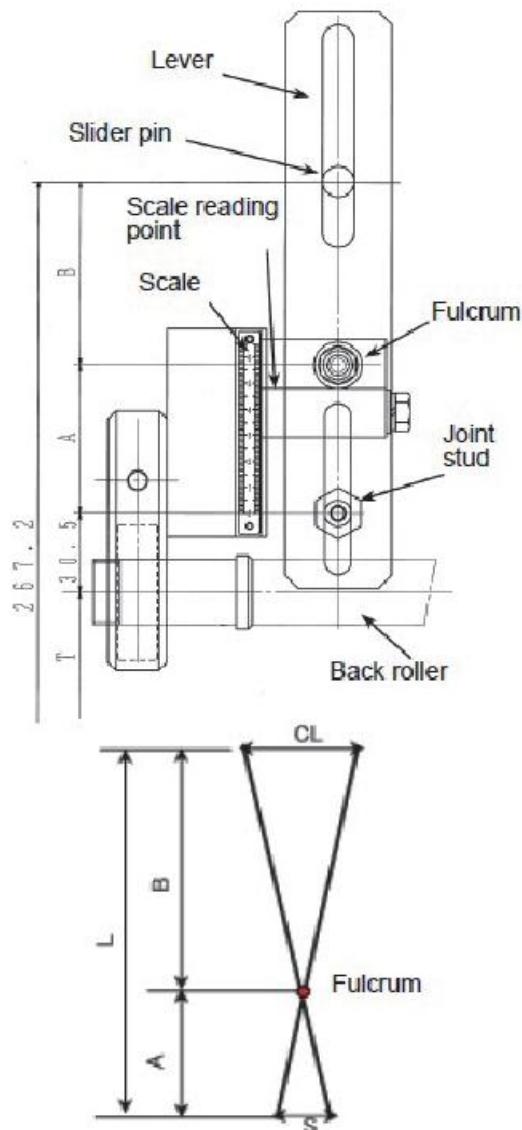
The traverse curve makes a triangular waveform as shown in the left figure.

REFERENCE: Sine waves are added to the curve on RX240. (Twin traverse)

[2] Setting the Traverse Distance

The traverse distance can be set arbitrarily by making it equal to the lever ratio for the roller gauge.

<Traverse distance set range: 2 to 10mm>



- (1) Place the lever in a vertical position.
- (2) Obtain the scale value set on the total gauge.
 1. Obtain the scale value to be set from the table in the following page.
 2. If the table does not include the scale value you want, calculate it by the following formula.

For the case of $L = 267.2 - 30.5 - T$

Scale value to be set =

$$T + (S + 0.5) * L / (CL + (S + 0.5)) - 113$$

- S: Set amount of traverse
- T: Total gauge (distance between the front and back rollers)
- CL: 10mm
- Distance between the slider pin and front roller: 267.2mm
- Distance between the back roller and joint stud: 30.5mm

- (3) Adjust the scale reading point to the obtained scale value.
 - Fulcrum point decided.
- (4) Adjust the center of the joint stud to "0" on the scale.

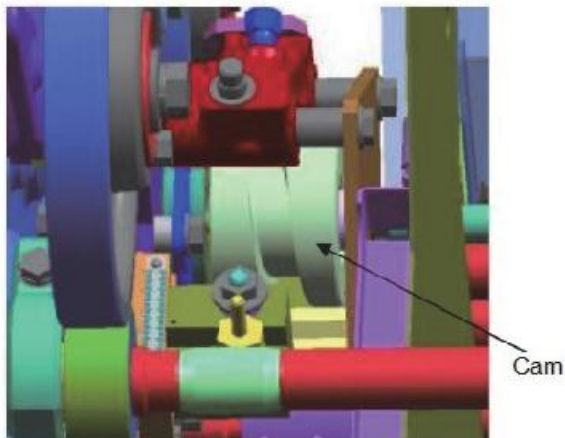
(Or adjust the distance between the joint stud and back roller to 30.5mm.)

NOTE: The traverse distance should be set to 2mm for compact yarn spinning.

[3] Scale Value Table

T Total gauge	(F-M gauge)	(M-B gauge)	CL Cam lift	S Traverse distance	A	B	L	Scale value
92	44	48	10	2	29	116	145	20
92	44	48	10	4	45	100	145	36
92	44	48	10	6	57	88	145	48
92	44	48	10	8	66	78	145	57
92	44	48	10	10	74	71	145	65
95	44	51	10	2	28	113	142	19
95	44	51	10	4	44	98	142	35
95	44	51	10	6	56	86	142	47
95	44	51	10	8	65	77	142	56
95	44	51	10	10	73	69	142	64
105	44	61	10	2	26	105	132	17
105	44	61	10	4	41	91	132	32
105	44	61	10	6	52	80	132	43
105	44	61	10	8	61	71	132	52
105	44	61	10	10	67	64	132	58
109	44	65	10	2	26	102	128	17
109	44	65	10	4	40	88	128	31
109	44	65	10	6	50	77	128	41
109	44	65	10	8	59	69	128	50
109	44	65	10	10	65	62	128	56
93	45	48	10	2	29	115	144	20
93	45	48	10	4	45	99	144	36
93	45	48	10	6	57	87	144	48
93	45	48	10	8	66	78	144	57
93	45	48	10	10	74	70	144	65
96	45	51	10	2	28	113	141	19
96	45	51	10	4	44	97	141	35
96	45	51	10	6	55	85	141	46
96	45	51	10	8	65	76	141	56
96	45	51	10	10	72	69	141	63
106	45	61	10	2	26	105	131	17
106	45	61	10	4	41	90	131	32
106	45	61	10	6	51	79	131	42
106	45	61	10	8	60	71	131	51
106	45	61	10	10	67	64	131	58
110	45	65	10	2	25	101	127	16
110	45	65	10	4	39	87	127	30
110	45	65	10	6	50	77	127	41
110	45	65	10	8	58	68	127	49
110	45	65	10	10	65	62	127	56
119	54	65	10	4	37	81	118	28
119	54	65	10	6	46	71	118	37
119	54	65	10	8	54	64	118	45
119	54	65	10	10	60	57	118	51
120	55	65	10	4	36	80	117	27
120	55	65	10	6	46	71	117	37
120	55	65	10	8	54	63	117	45
120	55	65	10	10	60	57	117	51

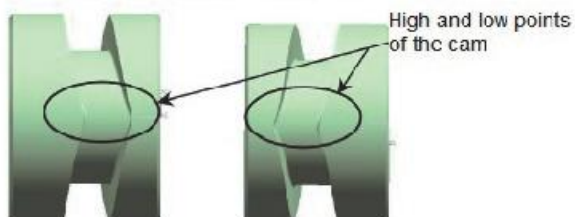
[4] Tip for Setting the Traverse Distance



(1) Lever in vertical position

The lever should be set to the vertical position before the traverse distance is adjusted.

With the lever in the vertical position, the high and low points of the cam come to the front when the traverse unit is placed horizontally by moving the motor pulley or running the frame.



4.1A.20 Setting the Side Traverse Motion

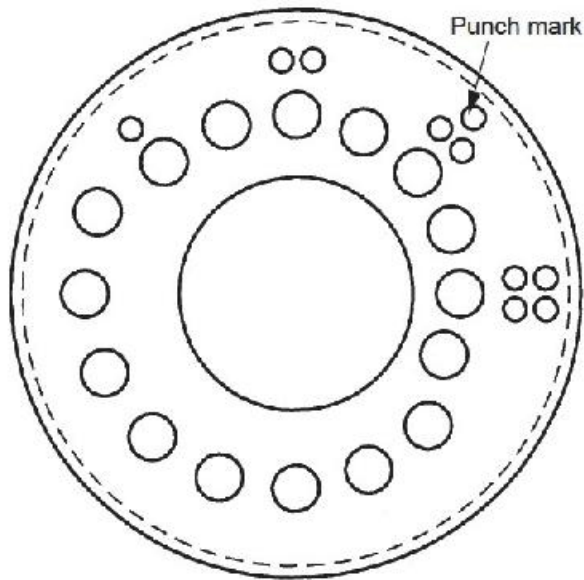


Fig. 1 Eccentric cam

(1) Change in Traverse amount

Positioning marks are punched on the surface of the eccentric cam.

For the compact specification, set the traverse amount to 4 mm. (Fig. 1)

The guideline for the traverse amount is as shown in the table below.

Table 1. Marks for traverse stroke

Number of “.”	Mechanical draft specification (mm)		Electronic draft specification (mm)	
	Standard specification	Compact specification	Standard specification	Compact specification
•	4	4	3	—
	5	—	4	4
• •	6	—	5	—
	7	—	6	—
• • •	8	—	7	—
	9	—	8	—
•• ••	10	—	9	—
	11	—	10	—

4.1A.21 Maintenance of Middle Roller Driving One-Way Clutch

The idle pulley in the middle roller driving system has a built-in one-way clutch.

It prevents broken yarn due to untwisting of the middle roller upon stopping. Since the service life of the oneway clutch is predetermined, carry out maintenance and replacement according to the procedure described below.

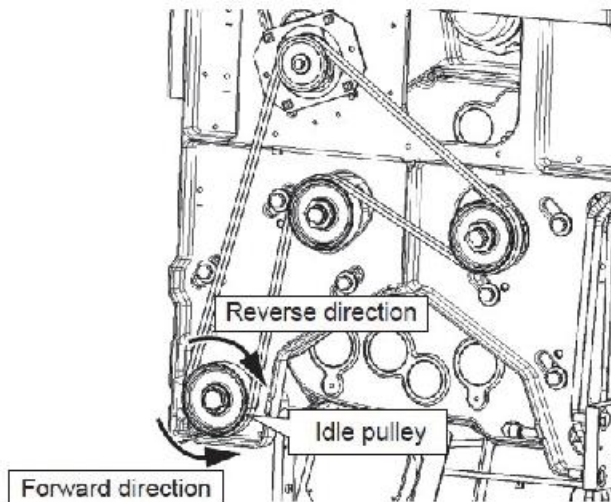
The whole assembly consisting of the clutch, shaft and housing should be replaced.

[1] Maintenance

Check the following points by manual rotation at the time of periodic inspection (every three months).

Always turn the machine main power off beforehand:

- (1) Rotate in the forward direction to confirm smooth rotation.
- (2) Rotate in the reverse direction (clutch engagement direction) to see no play in clutching.



If any abnormality (other than the above conditions) is found, replace the clutch as early as possible.

[2] Service life

[2.1] In normal yarn spinning

The service life (= replacement cycle) varies with the operating condition (middle roller rpm). The middle roller rpm can be obtained by monitoring the color function panel or calculated by the following equation:

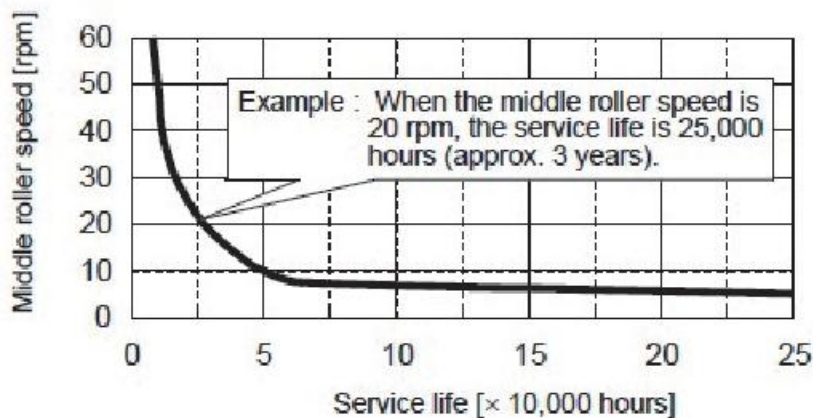
In normal yarn spinning

$$N_{Md} = \frac{11.79 \times N}{T} \times \frac{B.D}{T.D} \times \frac{D_B}{D_M + ta \times 2 \times 0.8}$$

Middle roller rpm	: NMd [rpm]	Total draft ratio	: TD
Spindle speed	: N [rpm]	Back roller diameter	: DB [mm]
Twist count	: T [TPM]	Middle roller diameter	: DM [mm]
Break draft ratio	: BD	Apron thickness	: ta [mm]

The graph below shows the service life or the replacement timing according to the middle roller rpm.

One-way clutch service life curve



[2.2] In slub yarn spinning

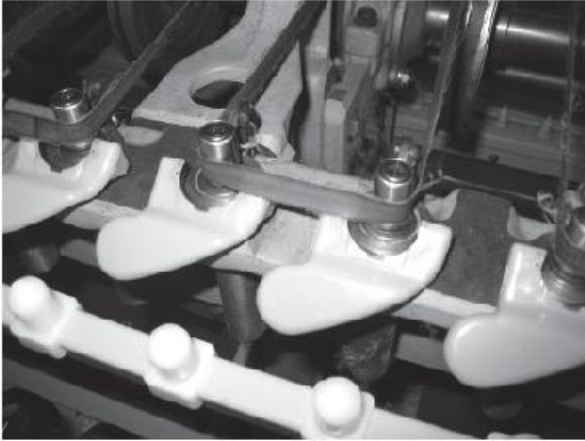
- In case of slub yarn spinning (slub formation by acceleration of middle and back rollers)
In case of continuous slub yarn spinning, replace the one-way clutch ASSY every year.

4.1A.22 Checking the Lubrication Points before Run

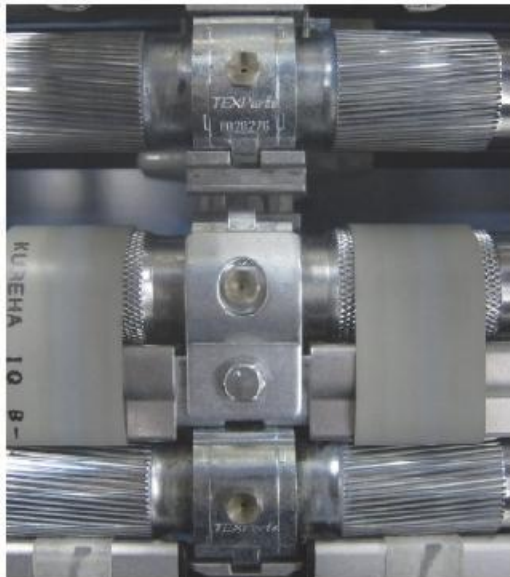
At the time of test run, check the following lubrication points:

- (1) Intermediate lifting unit (grease)
- (2) Spindle bolster (oil)
- (3) Each bottom roller neck bearing (grease)
- (4) Pedestal and tension pulley (grease)
- (5) Grease application on back roller gear

Spindle bolster



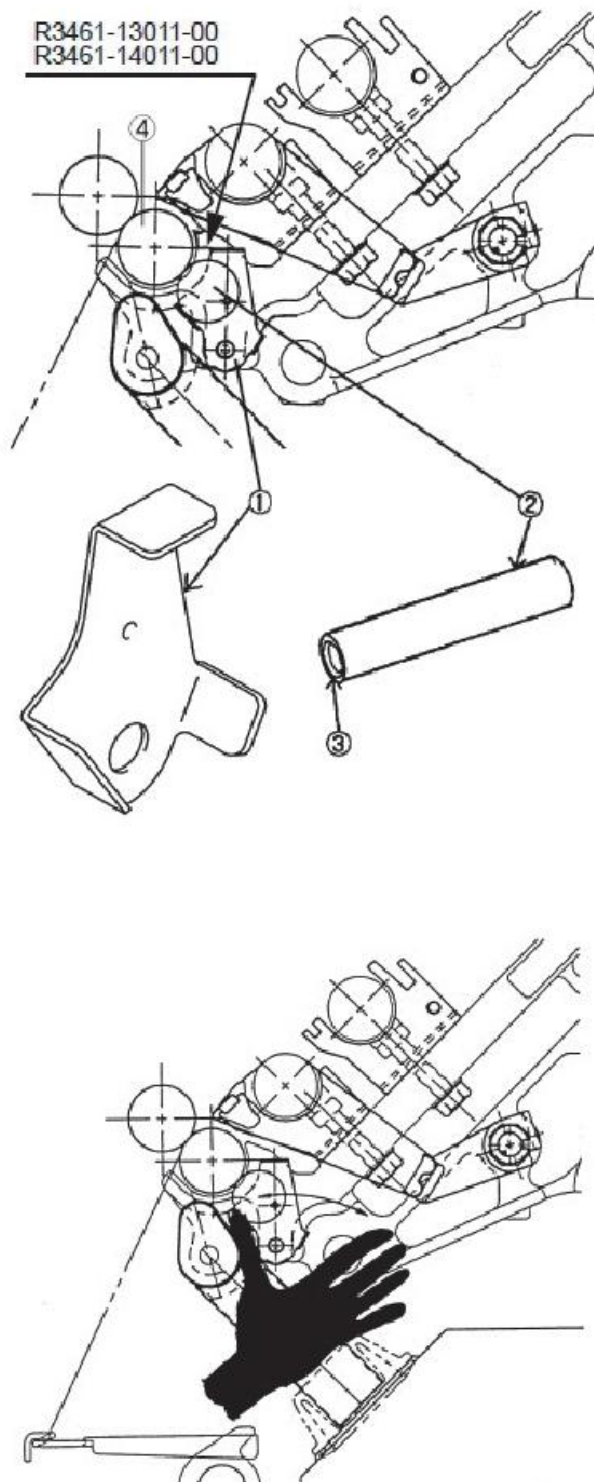
Neck bearing



4.1A.23 Installing the Bottom Clearers

TIP: Completely wipe off grease from the bottom rollers with powder.

[1] Front Bottom Clearers



(1) Installing

1. Set the front under clearer stopper so that its fluted side comes to the thicker side of the clearer.
2. Secure clearer drop-prevention bracket ① to the roller stand with a screw.
3. Install magnetic roller clearer ②.
4. On end ③ of roller clearer ② is a red marking.

Place all roller clearers with those markings facing to the GE.

(2) Checking

1. During the test run, check that roller clearers ② rotate smoothly.
2. Check that roller clearers rotate keeping parallel with front bottom rollers ④.
3. Check that red markings on the ends of the magnetic roller clearers face towards the GE.

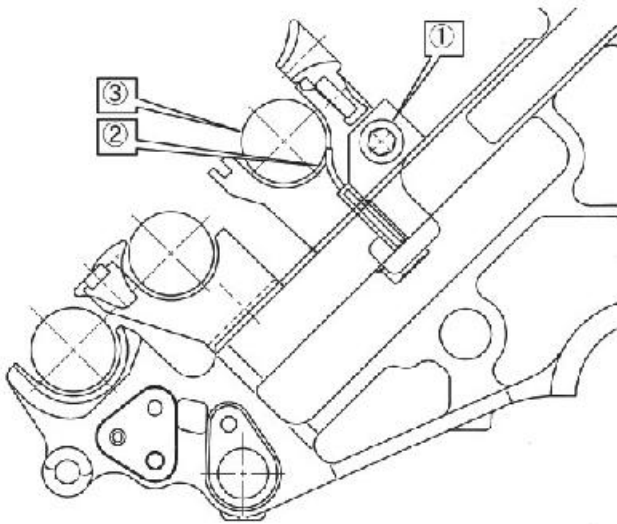
REFERENCE: If those markings do not face to the same direction, the magnetic force will be reduced soon.

4. Check that clearer drop-prevention bracket ① is mounted.

(3) Removing or setting the front under clearer

1. To remove: Insert your thumb between the flute and the front under clearer, then push it towards the center of the machine to release it.
2. To set: Put the front under clearer through the opening provided on the top of the stopper.

[2] Back Pat Clearers

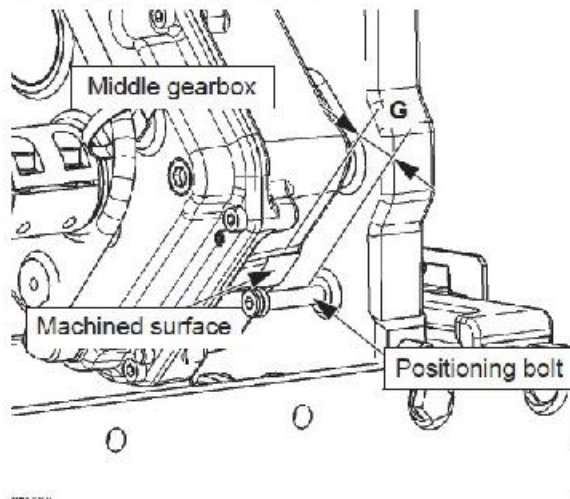


- (1) Installing
 - 1. Install clearer holder ① on the back roller slide.
 - 2. Hook pat ② onto back bottom roller ③.
- (2) Checking
 - 1. Check that there is no freed part.

4.1A.24 Method for Moving the Gearbox When Changing the Middle Roller Gauge

When changing the middle roller gauge, the gearbox has to be moved. Move the gearbox according to the method described below.

Be sure to check the gearbox position in the same way also before starting trial running after the delivery and installation.



- (1) Install the tool (positioning bolt, part No. 71106-08001-00) supplied with the machine on top of the stand.
- (2) Prepare a block gauge.
Gauge width: $G = \text{Roller gauge} - 27 \text{ [mm]}$
- (3) Use the above gauge and set the distance between the gearbox machined surface and positioning bolt.

REFERENCE: The gearbox can be moved easily by applying a lever between the side beam and gearbox.

5.1A Operation

Contents

5.1A.1	Operation	5.1KE-1
[1]	Start-up of the RX	5.1KE-3
[2]	Stop of the RX	5.1KE-3
5.1A.2	Signal Indicator	5.1KE-4
[1]	Lamp Color and RX Status	5.1KE-4
[2]	Operation When the Yellow Lamp Is Lit	5.1KE-5
[2.1]	For those RXs with an SCD	5.1KE-5
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5.1A.1 Operation



WARNING

Be sure to observe the safety rules given in
S.1 "Safe Work"

(1) Absolute precautions

1. Never start the RX without communicating your intention to co-workers or without confirming their answer to your signal.
2. Never reach out towards the rotating or operating sections until all units of the RX come to a complete stop. In the automatic doffing operation, be careful even if the RX seems to have stopped. The RX may temporarily stop and will start operation automatically and suddenly.
3. Never operate the RX in clothes which could become entangled in the rotating parts.
4. Never remove any of the warning notice, caution plates or instruction plates from the RX, no matter what.
5. The temporary warning notice (tag) should be removed only by the person who put it up, once it has become unnecessary.
6. Never get up on the RX (on the GE, OE, MH, pneumatic box, spindle rail, creel and other parts), no matter when the RX is in operation or on halt.
7. When using those RXs equipped with an SCD, never place a part or whole of your body under the doffing bar, no matter when the RX is in operation or on halt.
8. Never reach out towards the spindle drive belts when the RX is in operation (including piecing).

(2) Handling abnormal situations

1. Always power off the RX before making any adjustments or repairs to correct abnormalities occurring during operation.
2. If you turn off the RX, be sure to put up the warning notice (specified in the construction rules) on the power switch.
3. The temporary warning notice (tag) should be removed only by the person who put it up, once it has become unnecessary.
4. If a power failure or power-related error occurs, always turn the main switch off. After confirming recovery from such problems, turn the main switch on and run the RX.

(3) Other precautions

1. The supervisor should make sure that each worker sufficiently observes all safety rules.
2. Observe the safety codes and regulations enforced in individual countries.



CAUTION

Be sure to observe the precautions given in

S.1 "Safe Work"

S.1.2 "Rules for Safe Operation"

(4) Precautions for spinning

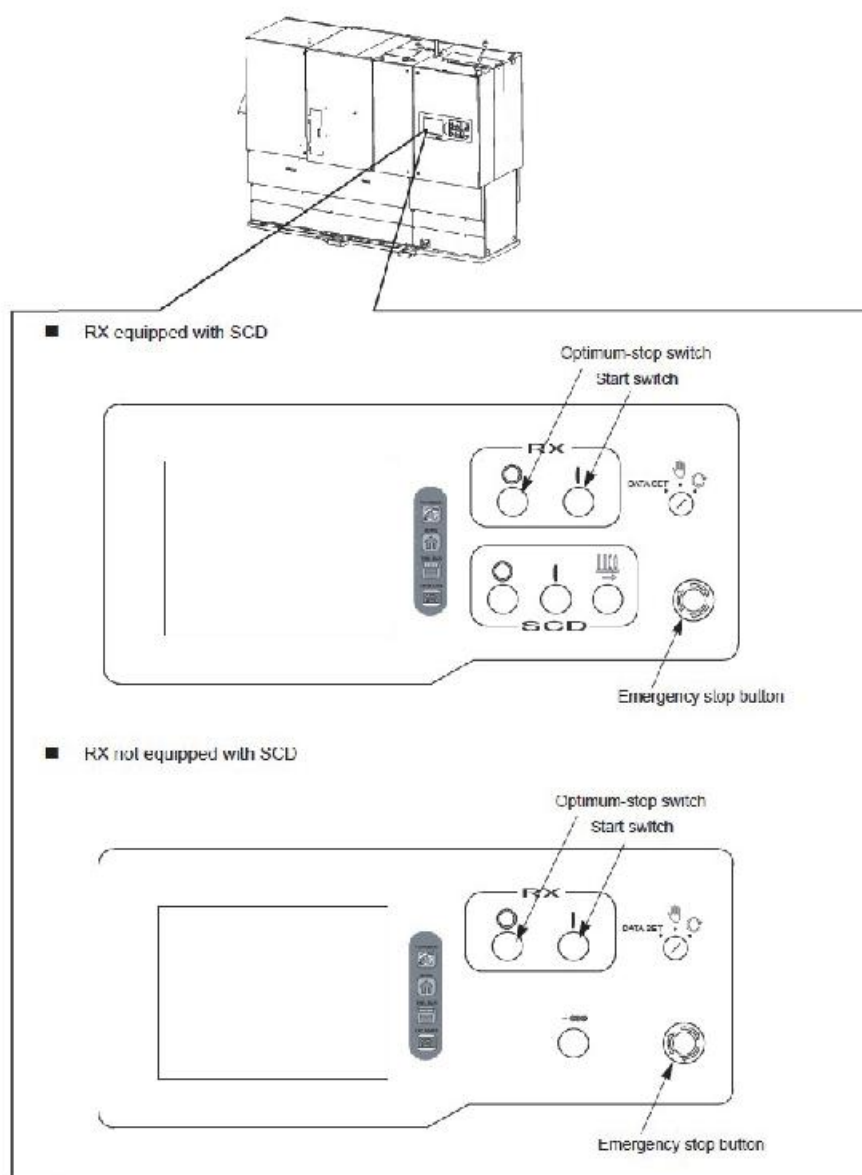
1. When removing fly, fleece or fiber dust, use a picker or take-up rod. Never do it directly by hand.
2. Never put anything under the lifting rail or reach out under it. The positive lifting system used in the RX positively drives the lifting rail even in the down-movement process, so any obstacle will result in a serious accident.
3. Never reach out towards the spindle cutters or step up to them, no matter when the RX is in operation or on halt.
4. For those RXs equipped with an SCD:
 - If the yellow lamp starts flashing, immediately go away from the RX or go out of the intra-frame passages. At the same time, be sure to bring out maintenance carts or roving carts from the intra-frame passages for preventing serious accidents.
 - When the operator has to go away from maintenance carts or roving carts, always bring out them from the intra-frame passages.
 - Never reach out towards the tray conveyer or its surrounding area even if the RX is on halt. If the conveyer has not finished transferring peg trays, it will suddenly start transferring if the RX is on halt.

(5) Precautions in handling bobbins

1. Until the spindles come to a complete stop, never touch bobbins or spindles by hand or doff bobbins.
2. When doffing bobbins, be sure to use the spindle brake and stop the spindles completely. Doffing bobbins which are in rotation will damage their insides, resulting in undoffed fullbobbins, broken or bent spindles, or other problems due to damaged bobbin insides.
3. When loading bobbins, be sure to stop the spindles completely with the spindle brake and then fit bobbins over the spindles fully.

(6) Prohibition and caution concerning the finger type spindle brake

1. Do not apply the finger brake to multiple spindles at a time. Otherwise, deceleration of other spindles, early wear of the spindle tape or other defects may arise.
2. After stopping a spindle and replacing the bobbin, never forget to release the brake.



[1] Start-up of the RX

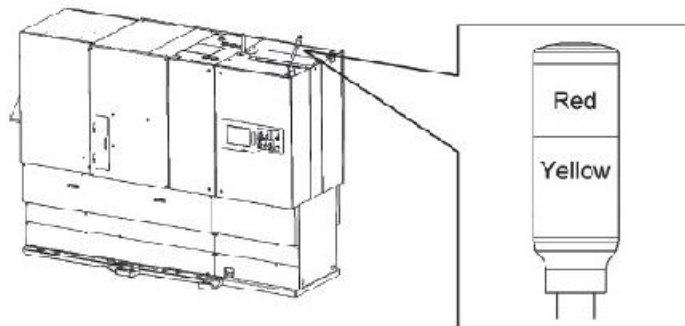
- (1) Turn ON the main breaker.
Operation is impossible for about 20 to 30 sec. after turning ON the breaker.
- (2) Press the Start switch to start the RX.
After doffing is completed and the full bobbin is reset, pressing the Start switch resets the lappets to start the machine.

[2] Stop of the RX

- (1) Press the optimum stop switch to stop the machine.
 1. Press the switch so that the ring rail stops in the preset optimum position.
 2. About 30 to 60 sec. after pressing the switch, the machine stops completely.
- (2) Press the emergency stop switch to stop the machine urgently. (This switch is provided on each of the GE and OE sides.)
 1. Pressing the switch stops the power feed to the main motor to stop the machine (including SCD and tray conveyance). At this time, the switch is locked.
 2. Turn the switch clockwise so that the lock is released.

5.1A.2 Signal Indicator

Each of OE and GE has a tower-shaped lamp and the lamp informs an operator of the RX state.

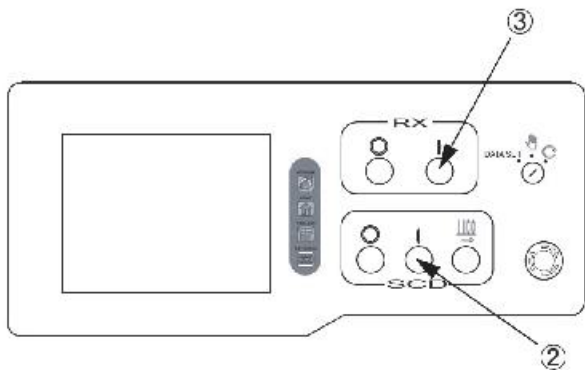
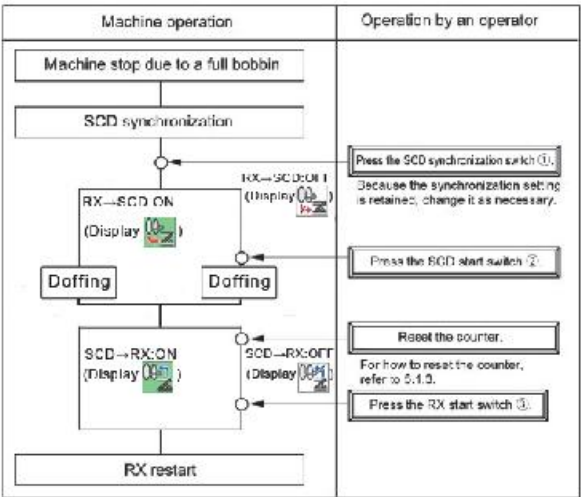
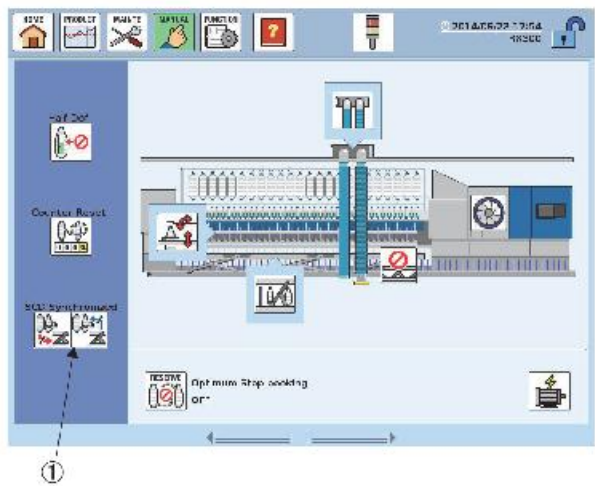


[1] Lamp Color and RX Status

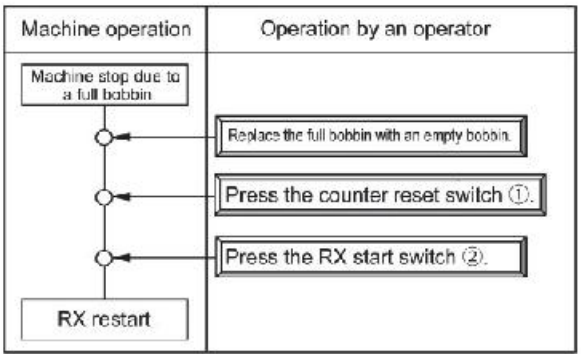
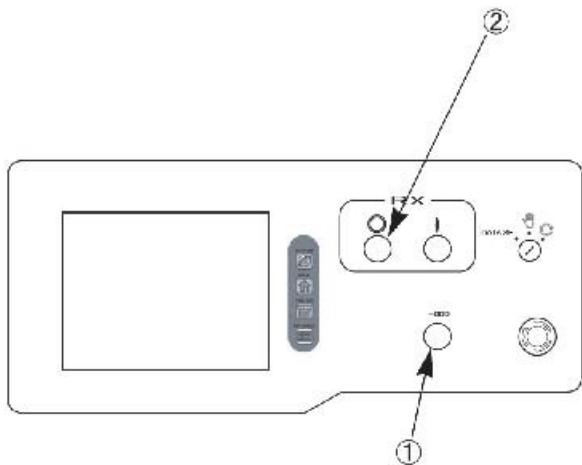
Lamp color	Status	Operator's action
Yellow lamp	1 Lights immediately before a full bobbin (the lighting start time can be set) or in a full-bobbin state.	1 Prepare for doffing. 2 When RX and SCD are operated separately, a) For those RXs with an SCD: After the full bobbin stops, press the SCD start button or operate individually to finish doffing. b) Press the RX Start switch to start.
Red lamp	1 Lights when a problem has occurred. 2 Turns off after a reset operation.	1 Check an error message on the operation panel and take necessary measures. 2 After removing the error causes, press the RESET switch. REFERENCE: For the details of the error message description, see Section 9.1

[2] Operation When the Yellow Lamp Is Lit

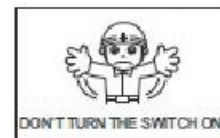
[2.1] For those RXs with an SCD



[2.2] For those RXs without an SCD



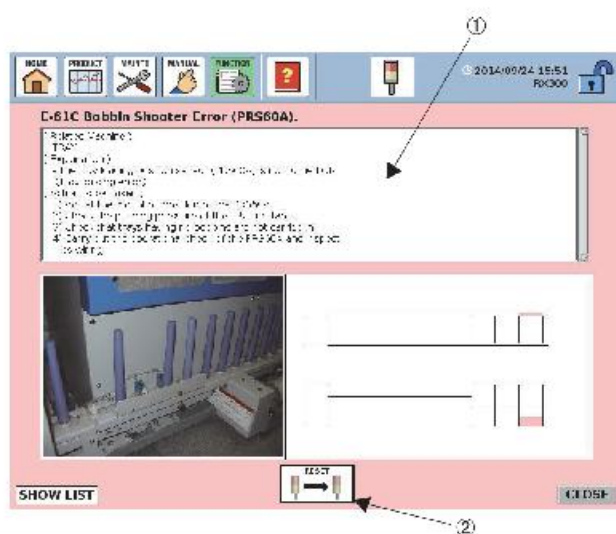
[3] Operation When the Red Lamp Is Lit



⚠ WARNING

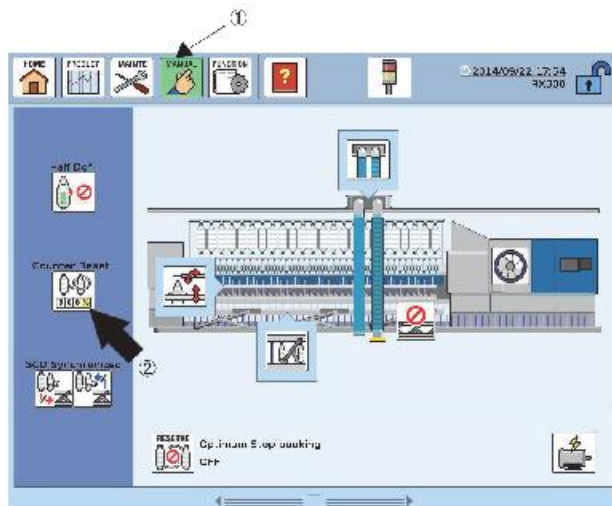
Be sure to observe the precautions given in

- S.1 "Safe Work"
- S.1.2 "Rules for Safe Operation"
- S.1.3 "Rules for Maintenance"
- S.1.4 "Precautions for Operating or Checking the Electrical Devices"



- (1) When the lamp is lit, check the error message ① on the operation panel.
- (2) Solve the problem according to the treatment method described in 9.1.
- (3) Touch the alarm reset key ② and cancel the alarm.
- (4) Press the start switch and restart the operation.

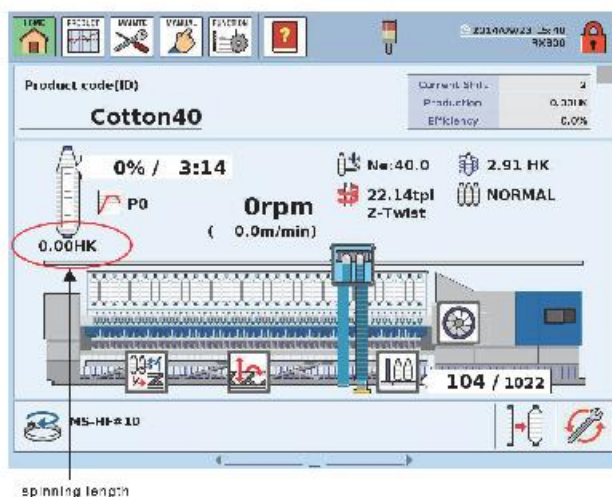
5.1A.3 Counter Reset Operation of a Machine with SCD



- (1) Click the [MANUAL] key ① on the HOME screen of the function panel.
- (2) Click the Counter Reset key ②.



- (3) When resetting the counter, touch [Yes].
When not resetting the counter, touch [No].



- (4) Touch the [HOME] key to check that "Spinning length" has become "0".

5.1A.4 Summary of Spinning Adjustment

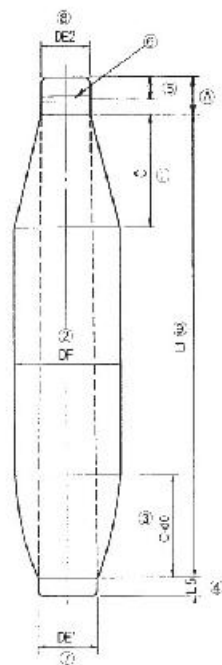
Carry out trial spinning, following the procedure below:

- (1) Select specific spindles to carry out trial spinning.
 1. Two-head machine: Four spindles at the GE end, four spindles near the middle of the stretcher, and four spindles at the OE end (12 spindles in total)
 2. Three-head machine: Four spindles at the GE end, four spindles near the middle of the stretcher between GE and MH, four spindles at both ends of MH, and four spindles at the OE end (20 spindles in total)
- (2) Paying attention to the following points, doff and spin two or three and adjust them if there are any defects.
 1. Whether the running state of the roving supplied to the back roller is normal (Check the roving guide position and the trumpet position.)
 2. Whether the positional relation between the top roller and the bottom roller and the apron rotation state are normal
 3. Whether the operation of the clearer roller is normal
 4. Whether the spindle speed is unstable
 5. Whether an appropriate traveler is selected, according to the spinning tension of the yarn
 6. Whether the traveler clearer interferes with the traveler
 7. Whether the ballooning is abnormal or the yarn interferes with the bobbin upper end
 8. Whether the actual full bobbin yarn length is the same as the set yarn length
 9. Whether the external view of the full bobbin is normal
 10. Whether there is variation in the yarn quality including yarn count, twist count, and strength due to spinning place difference
 11. Whether the yarn breaks when automatic devices, such as a blow cleaner, are operated
- (3) Recheck the above points in all-spindle spinning and start an actual operation after adjustment.

5.1A.5 Adjustment of Bobbin Form

- (1) The bobbin form is determined by the set value input in the operation panel.
- (2) Fine adjustment is needed, depending on spinning conditions, such as spinning fiber characteristics and the number of revolutions of the spindle.
- (3) When changing the spinning specifications, set a value that meets the machine conditions again.
(For the details of set items, see the table below.)

[1] Standard Bobbin Form



To maximize the production capacity of the RX, it is very important to form cops in an appropriate form.

Standard Bobbin Form

(Unit: mm)

No.	Bobbin form related item	Symbol	Standard dimension
①	Chase length	C	$R + 6$
②	Winding diameter (MAX)	(DF)	$R - 3$
③	Chase length correction	d0	0
④	Winding start position	L5	8
*⑤	Top bunch position		8 to 10
*⑥	Number of windings at top bunch	—	2 to 4 windings
⑦	Bobbin diameter (bottom)	DE1	Varies depending on the specifications.
⑧	Bobbin diameter (top)	DE2	
⑨	Total lift length	Lt	
⑩	Ring bore diameter	R	

REFERENCE:

- Dimension ① should be 17 mm or more for those RXs equipped with an SCD.
- The typical yarn pitch coefficient is 6.0 to 7.0.
- Items marked with an asterisk (*) in the above table should apply to those RXs with an SCD.

[2] Initial Setting Value of the Bobbin Form

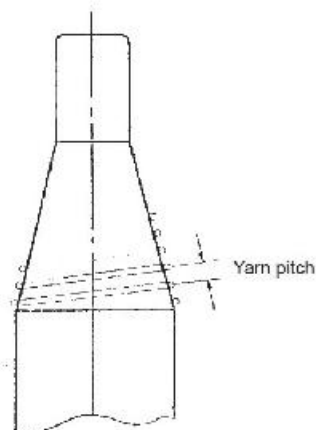
(1) Setting items and standard set value of the bobbin form (When spinning cotton)

Symbol	Setting item	Range	Standard set value by bobbin length		
			180 mm	210 mm	230 mm
Ne	Yarn number count	1.0 to 300.0	Spinning condition	Spinning condition	Spinning condition
W	Roving grain	20 to 600 gr/30yd	Spinning condition	Spinning condition	Spinning condition
K	Yarn pitch coefficient	4.0 to 9.0	7 times	7 times	7 times
G	Yarn weight (ring dia.)	10.0 to 200.0 g	32 to 34 g (36)	50 to 53 g (41)	80 to 83 g (44)
TM	TM Twist multiplier	1.5 to 10.00	Spinning condition	Spinning condition	Spinning condition
Lt	Total lift length	100 to 255 mm	155	185	205
C	Chase length	30 to 75 mm	R + 6	R + 6	R + 6
R	Ring bore dia.	30 to 60 mm	Specifications for the machine	Specifications for the machine	Specifications for the machine
DE1	Bobbin dia. (bottom)	20.0 to 30.0 mm	25	27	27
DE2	Bobbin dia. (top)	15.0 to 25.0 mm	19	21	21
BL	Bobbin length	165 to 255 mm	180	210	230
du	Winding for increasing the amount of the upper part	0 to 6	0	0	0
d1	Winding for increasing the amount	0 to 5	0	0	0
L6	Top bunch position	155 to 255 mm	170	200	220

REFERENCE:

Because the standard set value is a reference value, readjustment is necessary after test spinning.

- The spinning weight (G) differs, depending on the spinning fiber to use and spinning conditions.
- DE1 and DE2 will vary depending upon the specifications, so check them according to the bobbin drawings.



(2) Calculation of yarn pitch

The yarn pitch is a winding interval of the yarn in the ascending process.

1. The yarn pitch is to be set with a multiple of the yarn diameter.
2. The calculation formula of the yarn diameter is shown below.

d : Yarn diameter (mm)

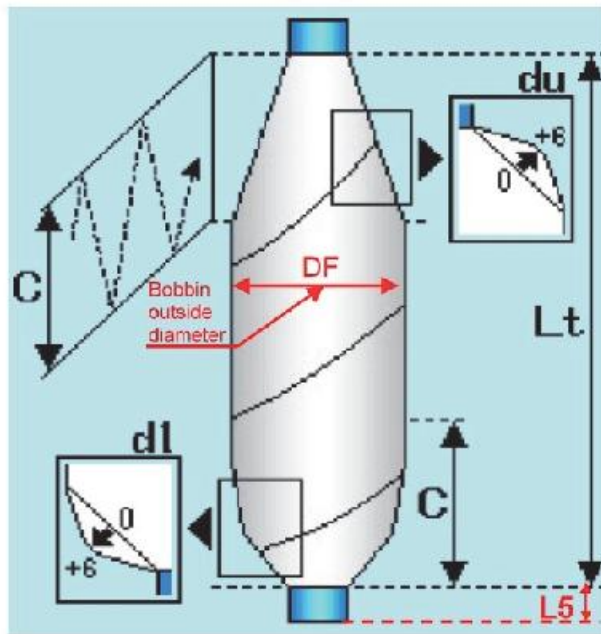
Ne : British yarn count

$$d = 1/1.06\sqrt{Ne}$$

3. Yarn pitch = $d \times K$

The typical value of K is 6.0 to 7.0.

[3] Basic Adjustment of Bobbin Form



(1) Adjustment of lift

1. Adjustment of winding start position (L5)

Set 8 mm for L5.

To make the winding start position higher, set a larger value for L5. To make it lower, set a smaller value.

2. Adjustment of winding end position (Lt)

Lt varies depending on the lift length.

- To make the winding end position higher, set Lt to the large numerical value.
- To make the winding end position lower, set Lt to the small numerical value.

REFERENCE:

Increase/decrease Lt to change slightly the bobbin outside diameter.

(2) Adjustment of bobbin outside diameter

The standard bobbin outside diameter (MAX mm) should be “ring inside diameter – 3 mm”.

- To make the bobbin outside diameter smaller, set a smaller value for the yarn weight (G). To make it larger, set a larger value.
- G varies depending on the spinning fiber and condition.

(3) Adjustment of the bobbin winding start shape and stop shape

Set the level of amount-increasing winding (dl or du).

The level can be set in steps from 0 (standard value) to +6 (maximum value). As the value is larger, more can be wound.

5.1A.6 Bobbin Form Defect and Remedy

[1] Investigation of Bobbin Form

If the bobbin form is not desirable, measure the current bobbin form, record the measurement result along with the set value, and change the set value.

(1) Measurement item of bobbin form

Measure the form dimensions shown in the above “standard bobbin form” and record the results.

(2) At the same time, measure the bobbin weight.

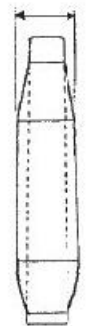
(3) Recording the operation panel input value

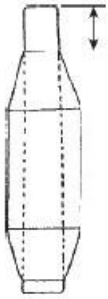
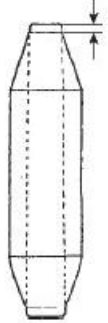
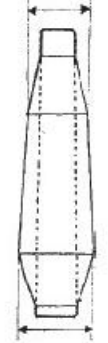
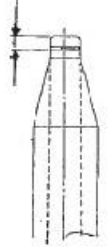
Record the current set value described in Subsection 7.1A.5 [6] “Setting item of bobbin form” of Section 7.1.

(4) Adjustment of bobbin form

Clarify the difference between the current bobbin form and standard bobbin form, and change the set value that determines the bobbin form. It is desirable to change the set value one by one. Every time the new bobbin form is obtained by changing the set value, measure the bobbin form and record the results along with the set value so that the influence of the set value on the bobbin form can be grasped later.

[2] Example of Bobbin Form Defect and Remedy

No.	Bobbin form	Defect	Cause	Remedy
1		The yarn winding start and end positions are low as a whole.	- L5 (winding start position) is too low. - The ring rail zero point position is abnormal. (When the ring rail matches the bottom of the bobbin, the plate height displayed on the monitor screen is not 0 mm)	- Increase the set value of L5. (The standard is 8 mm) - Set again the zero point position of the ring rail.
2		The yarn winding start and end positions are high as a whole.	- L5 (winding start position) is too high. - Same as No. 1 - Item 2.	- Decrease the set value of L5. - Set again the zero point position of the ring rail.
3		- The bobbin outside diameter is too small. (Has margin against the ring inside diameter) - The winding position is good.	The set value of G (yarn weight) is too small.	Increase the set value of G (yarn weight). REFERENCE: For the standard yarn weight, see the standard bobbin form value.
4		- The bobbin outside diameter is too large. (Has no margin against the ring inside diameter) - The winding position is good.	The set value of G (yarn weight) is too large.	Decrease the set value of G (yarn weight).

No.	Bobbin form	Defect	Cause	Remedy
5		- The winding end position is too low. - The winding start position is good.	1 The set value of Lt (total lift length) is too small.	1 Increase the set value of Lt (total lift length). ADJUSTMENT: In the case of the one with the SCD, the length of 17 mm or more is required for the distance between the winding end position and the bobbin top. Do not wind excessively. REFERENCE: For the standard total lift length, see the standard bobbin form value.
6		- The winding end position is too high. - The winding start position is good.	1 The set value of Lt (total lift length) is too large.	1 Decrease the set value of Lt (total lift length). ADJUSTMENT: In the case of the one with the SCD, the length of 17 mm or more is required for the distance between the winding end position and the bobbin top. Do not wind excessively.
7		There is a big difference in outside diameter between the bobbin top and bottom.	1 Input values of DE1 (bobbin diameter bottom) and DE2 (bobbin diameter top) are wrong. 2 The parallel correction winding is insufficient.	1 Measure the empty bobbin diameter and input the measured value. (DE1 and DE2) 2 Set DE2 (bobbin diameter top) to the slightly smaller value.
8		The top bunch winding position is too high. Or it is too low.	1 The setting of L6 (top bunch position) is inappropriate.	1 The length of 8 mm is standard for the distance between the bunch winding position and the bobbin top in actual measurement. Measure and adjust. 2 When the bunch winding position is too high, reduce the set value of L6. 3 When the bunch winding position is too low, increase the set value of L6.
9		The number of the top bunch windings is too small or too large.		1 Adjust the number of windings. (Refer to Section 7.1, Subsection 7.1A.6 [6].)

5.1A.7 Remedy for Frequent Yarn Break at the Time of Start

[1] Investigation of the Yarn Break Status

Observe the status before and after yarn break and identify the cause of the yarn break.

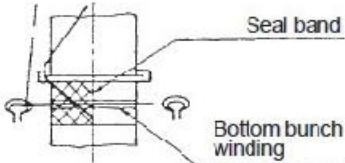
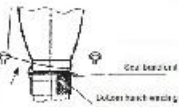
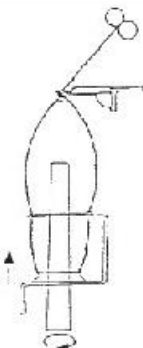
No.	Check point	Possible cause
1	Status of snarl before the start of operation	The snarl is too long so that the balloon is collapsed or caught by the bobbins and hits the traveler, resulting in break.
2	Check whether yarn has been broken or not before the start of operation.	The bottom bunch winding has become loose so that yarn is broken when full bobbins are doffed from the spindles. The number of bottom bunch windings is small.
3	Timing between the lifting operation at the 2nd moving-up and the start of spindles revolution.	The spindles have started rotation in the 2nd moving-up process of the lifting operation.
4	The ballooning status at the time of start	• Snarl • No ballooning takes place. (The traveler is too light so that yarn works out of the traveler.)
5	Yarn break timing (How quickly does the yarn break after start?)	• The acceleration speed of the spindle rotation is low. • The tension of wound yarn is too low at the start of winding. (The initial spindle speed is too low.)
6	Type of yarn breaks (caught by the snail wire, etc.)	• Snarl remains unremoved. (Improper start timing) • Yarn works out of the traveler. (Improper stop timing)
7	Yarn end on the bobbin	• No yarn is wound on a bobbin at all. (Insufficient bunch windings or improper winding position)
8	Winding start position on bobbin	• Improper start timing

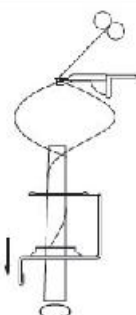
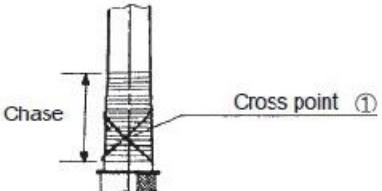
REFERENCE:

If the RX is driven in the cold state (20°C or below, e.g. in winter season), the middle roller may fail to feed fleece due to the apron hardened by the low temperature, causing yarn breaks frequently.

When keeping the RX in non-operation for a long time, therefore, prevent it from becoming subjected to the ambient temperature of 20°C or below.

[2] Yarn Break States and Remedy

No.	Yarn break states	Remedy
1	 1 A long snarl is generated. 2 At the time of start, a long snarl is caught by the bobbin and cut by the traveler resulting in the yarn cut.	1 The possible cause is a stop delay, so put the spindle brake timing forwards. (For details, refer to Subsection 7.1A.6 [7].)
2	 The number of bottom bunch windings is too small.	1 Adjust the number of bottom-bunch windings to 1.5 to 2.5 turns. (For details, refer to Subsection 7.1A.6 [6].) 2 Modify the set value of L0 (Bottom bunch position) so that the bottom bunch winding starts 5 mm below the cutter. 3 If this winding is not secure, the bottom winding will not be cut at the time of doffing, causing yarn breaks at the start of operation. 4 On the contrary, if yarn winds around the spindle seal band excessively, the remaining yarn will accumulate on the spindles, resulting in yarn problems.
3	 The stop time of the spindle is delayed. 1) When the full bobbin is removed, the surplus yarn is wound on the spindle. 2) When mounting the empty bobbin, it cannot be inserted completely up to the cutter unit. 3) Resistance is generated when the full bobbin is removed at the next doffing. (Causes the full bobbin to be remained) 4) Snarl is easy to occur causing the yarn to be cut at the time of restart.	Advance the spindle drive system stop timing (decrease t61).
4	 1 There is no snarl before start. 2 At the time of start, the balloon is in disorder and caught by the snail wire resulting in the yarn break. 3 The spindle starts turning while the secondary ascending of the ring rail.	1 Extend TS0 (spindle start time) to adjust so that the spindles start turning just after the ring rail start the 1st moving-down.

No.	Yarn break states	Remedy										
5	 Yarn is out of the traveler.	1 Adjust the 1st moving-up operation in order to prevent yarn from getting slacked at the time of fullbobbin stop. (For the adjustment procedure, refer to Subsection 7.1A.6 [7].) 2 Decrease the set value of L2 (2nd moved-up position.)										
6	 Yarn becomes slacked and broken.	1 Increase the set value of ACCS (Spindle acceleration time). 2 Decrease the set value of L2 (2nd moved-up position).										
7	1 At the time of winding start, yarn catches on the snail wire, resulting in a broken yarn.	Take actions given in steps (1) and (4).										
8	1 No yarn is wound on a bobbin at all.	Take actions given in step (8).										
9	Start timing that is seen in the winding position at the time of heaving operation  Chase Cross point ① Correct winding position  Too high ①  Too low ②	Status of ①: Since the winding is performed from the position higher than the chase, the yarn at the portion become loose causing the yarn break. Status of ②: Since the start timing is late, heaving operation is completed without the extension of the snarl and the balloon becomes large causing the yarn break. ADJUSTMENT: The start timing should be adjusted using mainly TS0 and L2. <table><tr><th>Status</th><th>TS0 Spindle start time set value</th><th>L2 Secondary ascend position set value.</th></tr><tr><td>①</td><td>Increase the value.</td><td>Decrease the value.</td></tr><tr><td>②</td><td>Decrease the value.</td><td>Increase the value.</td></tr></table>		Status	TS0 Spindle start time set value	L2 Secondary ascend position set value.	①	Increase the value.	Decrease the value.	②	Decrease the value.	Increase the value.
Status	TS0 Spindle start time set value	L2 Secondary ascend position set value.										
①	Increase the value.	Decrease the value.										
②	Decrease the value.	Increase the value.										

5.1A.8 Investigating Frequent Yarn Breaks During Operation

[1] Investigation of the Yarn Break States

(1) Checking the spinning conditions

If yarn breaks frequently, check the spinning conditions shown below.

No.	Check point	Possible cause
1	Roving u% and weight	• Defective roving
2	Temperature and humidity	• Air conditioning fault
3	Traveler wear status	• Traveler life limit
4	Actual number of twists (See the "Display during operation" on the LCD)	• Increase in the spindle drive belt slip

(2) Checking the number of yarn breaks

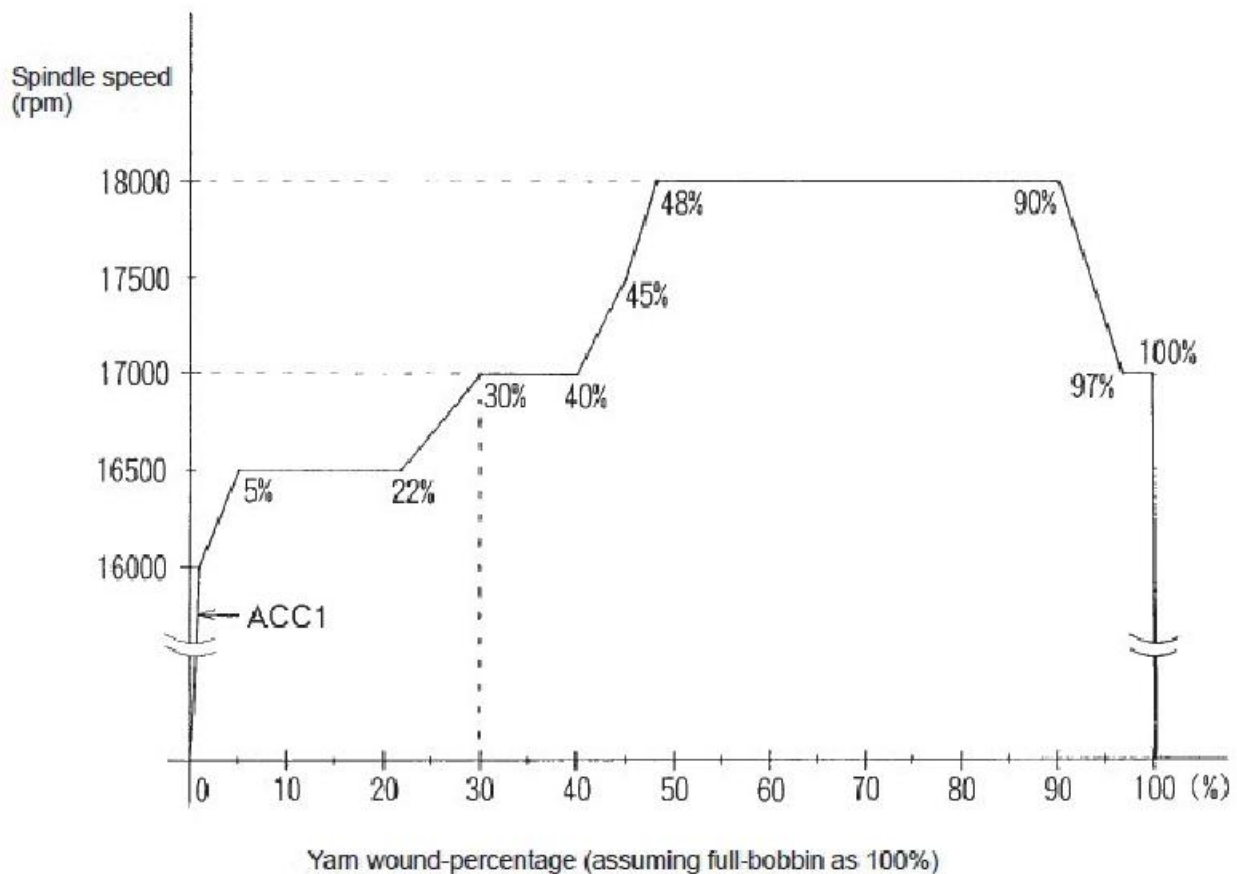
No.	Check point	Possible cause
1	At every stage of the specified wound-percentage	• Traveler selection fault • Setting fault of the spindle speed
2	At each of the RXs, at each side of RH and LH sides	• External factors
3	Spindles on which yarn breaks occur frequently	• The spindle speed is too low, so the collector comes off. • Spindle centering fault, damaged ring, etc.
4	Yarn break status	• Yarn break due to excessive tension, balloon collapses

5.1A.9 Adjustment of the Automatic Spindle Speed Shift

- (1) When the stretch is long at the start of winding, the spinning tension is large, so the yarn is wound on the bobbin at the relatively low speed sequentially after that and in the position in which the spinning tension is stabilized the spindle is revolved at high speed to improve the efficiency of the machine.
- (2) Through key input using the sheet-switch panel of the out-end, the speed shift curve of the spindle speed is set and the inverter speed change is performed by the output signal to be calculated by the computer.
- (3) Since the adjustment varies greatly depending on the spinning conditions at that time, the optimum conditions should be determined taking into account the spinning of all spindles, yarn quality, yarn breaks and so on.

In general, the yarn break near full-bobbin can be restricted by setting so that the speed just before the fullbobbin can be slightly low. For the spindle speed setting procedure, see Section 7.1, "Operation Panel."

Typical spindle speed shift pattern



6.1A Spinning

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6.1A.1 Test Run and Check Items

[1] Outline of Test Run

Before going into the practical production, set up the RX according to the specified spinning conditions and carry out the following test run by using roving to be used in the practical production.

- (1) First test spinning (Test spinning with limited spindles)
 1. 2-head version: 4 spindles at GE, around middle longitudinally, and OE each (total of 12 spindles)
 2. 3-head version: 4 spindles at GE, around middle between GE and MH longitudinally, sides of MH, and OE each (total of 20 spindles)

For test spinning, wind yarn up to full two or three times to check the spinnin state and quality of spun yarn. If any problem is found, make necessary adjustments, and execute the test spinning again for 12 spindles or more to check/adjus again.

- (2) Second test spinning

At the second stage of the test run, perform spinning using all of the spindles.

Check the spinning state, the quality of spun yarn and other conditions given in Subsection 6.1.1 [2] If any problem is found, make necessary adjustments.

Repeat the above sequence of the test spinning, checking, and adjustment.

For smooth practical production, it is very important to determine the optimum conditions by carrying out the test run carefully.

[2] Items to be Checked During Test Run

Check	What to do
(1) Traveling state of roving fed	• Check the position of the roving guides. • Check the traverse state of the trumpets.
(2) Top rollers Bottom rollers	• Check the parallelism and position of the top rollers. • Check the rotating state of those rollers.
(3) Top aprons Bottom aprons	• Check the position, sideways shift, and rotating state of the aprons.
(4) Clearers	• Check the rotating and working states of the clearers.
(5) Spinning tension	• Choose the correct traveller type.
(6) Ballooning	• Check the distance from the bobbin tops to the snail wires. • Check the centering of the balloon control rings to the spindles.
(7) Traveller clearer gage	• Check the fly accumulating state on the travellers.
(8) Expected number of hanks (yarn length)	• Check the length of yarn wound up to full.
(9) Shape of cops	• Check the shape, weight and hardness of cops, as well as the position of the top and bottom bunches and its number of windings.
(10) Quality of spun yarn	• Check the yarn number count, the number of twists, yarn evenness (U%), twist irregularity (by using spectrograms), IPI, fluff, and strength. • Significant difference between the GE, middle, and OE, and between the R and L sides.
(11) Yarn break at the start of running	• Check the starting timing. • Check the related operations of the connected automatic devices.
(12) Yarn break during running	• Check the frequency of yarn breaks during normal spinning operation (at each of the wound percentages). • Check the frequency of yarn breaks on each of the spindles.
(13) Collector	• Check the fitting of the collector.

6.1A.2 Preparation

[1] Ring Running-in

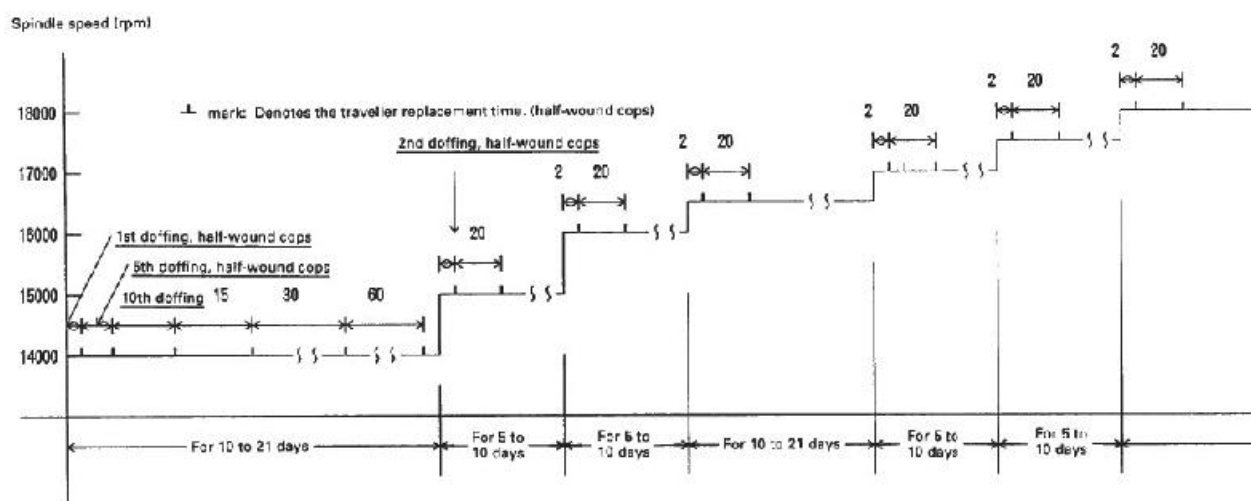
When using new rings, you should go into the ring running-in in which the spindle speed should be gradually increased so that the rings get to fit the travellers. Without the ring running-in, the RX will not produce high quality yarn or the ring service life will become extremely short.

The ring running-in schedule differs depending upon the material of rings, roving type, and spindle speed. The typical schedule and the setting samples are given on the following pages. Choose the operating pattern sample similar to your desired pattern and make your own running-in plan based on the sample.

Generally, the ring running-in has the following tendency:

Running-in period	Relatively short Long time required	
	Running-in period →	
Yarn number count	Low (Coarse yarn) →	Medium (Medium yarn) → High (Fine yarn)
Fiber	Chemical/ synthetic fiber yarn →	Cotton blended yarn → Carded yarn → Combed yarn
Twist	Hard twist →	Soft twist

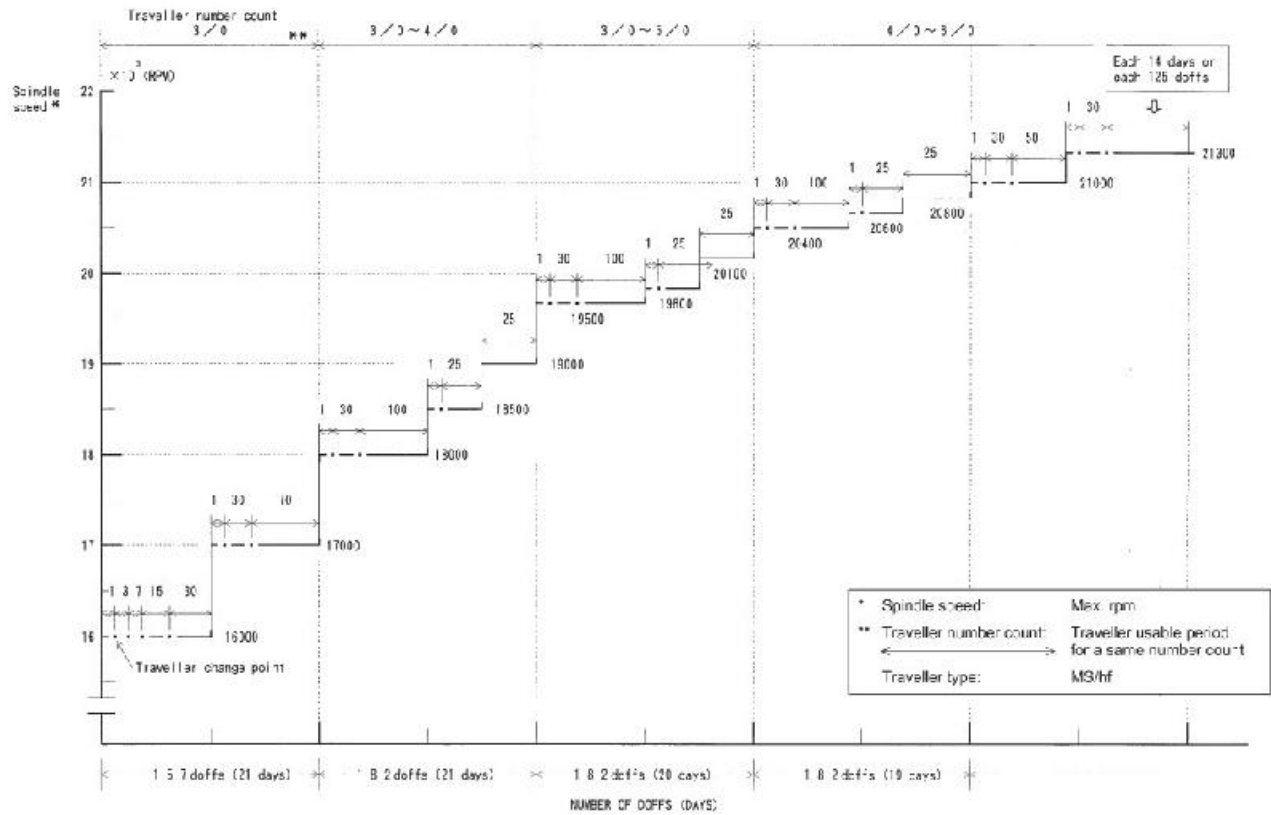
■ Typical ring running-in schedule (Max. target speed : 18,000 rpm)



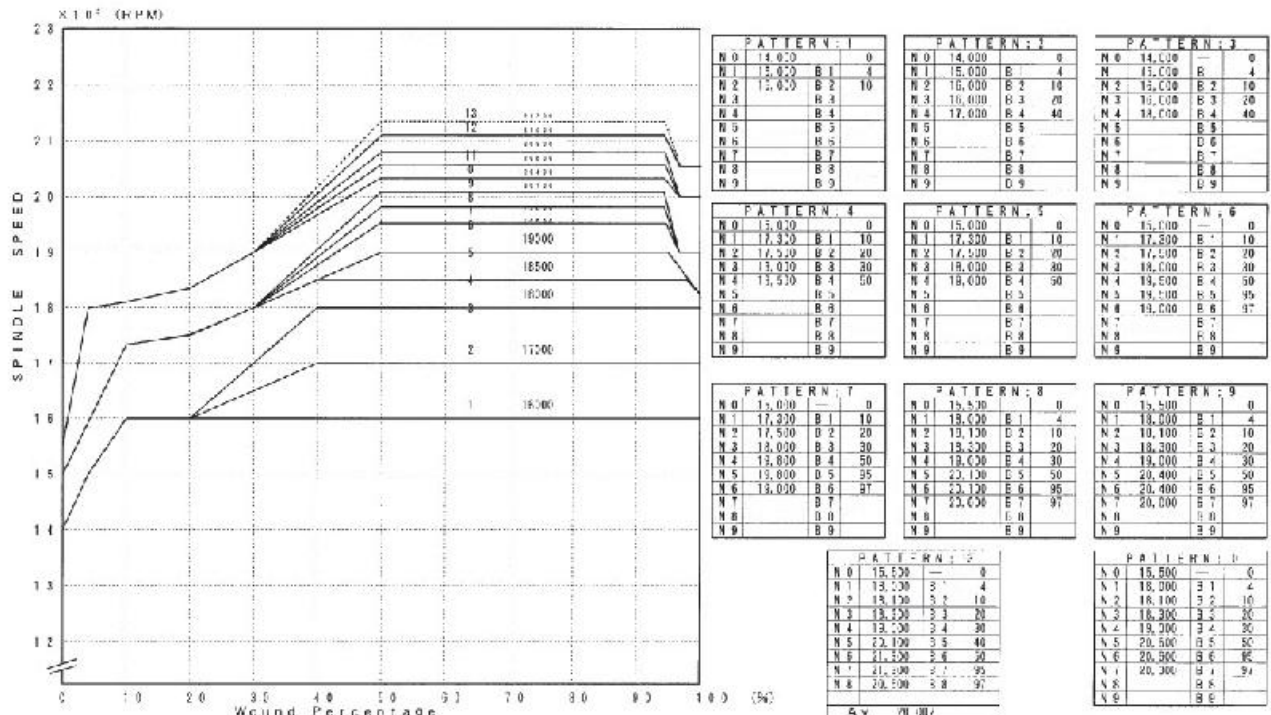
NOTE: Notes for ring running-in

- (1) Start the ring running-in with the spindle speed approx. 20% less than the maximum target speed.
- (2) Use the travellers whose number count is 1 to 2 smaller than the optimum traveller number count.
- (3) Increase the spindle speed by 1,000 rpm at each time of the speed change until it reaches approx. 90% of the maximum target speed. After that, increase the speed by 300 to 500 rpm at each time.
- (4) When increasing the spindle speed, be sure to check the spinning tension and occurrence of yarn breaks. If there is any problem with them, return the spindle speed to the previous one, run the RX for one to two days, then increase the spindle speed again.

■ Typical ring running-in schedule (Max. target speed: 21,300 rpm)



■ Spindle speed shift pattern example in ring running-in (Max. target speed: 21,300 rpm)



6.1A.2 Preparation

■ Setting examples for the ring running-in

(1) Maximum target speed: 18,000 rpm

Spinning conditions:

- Combed yarn Ne 40
- Ring diameter $\phi 38$
- Lift 180 mm

Running-in steps	1	2	3	4	5	6	7	8	9
Max. spindle speed (rpm)	13,000	14,000	15,000	15,500	16,000	16,500	17,000	17,500	18,000
N0 Initial spindle speed	13,000	13,000	13,200	13,200	13,200	13,400	13,400	13,800	13,800
N1 1st spindle speed	13,000	13,200	13,600	14,000	14,200	14,400	14,800	15,200	15,600
B1 Wound percentage	98	5	5	5	5	5	5	5	5
N2 2nd spindle speed		13,500	14,000	14,500	14,400	14,600	15,000	15,400	16,000
B2 Wound percentage		45	40	30	10	10	10	10	10
N3 3rd spindle speed		14,000	15,000	15,000	14,600	14,800	15,500	15,600	16,500
B3 Wound percentage		55	55	40	20	20	20	20	20
N4 4th spindle speed		13,000	14,000	15,500	14,800	15,100	16,000	16,200	17,000
B4 Wound percentage		98	98	55	30	30	30	30	30
N5 5th spindle speed				14,000	15,100	15,500	16,600	16,800	17,500
B5 Wound percentage				98	40	40	40	40	40
N6 6th spindle speed					16,000	16,500	17,000	17,500	18,000
B6 Wound percentage					55	55	50	50	50
N7 7th spindle speed					16,000	16,500	17,000	17,500	18,000
B7 Wound percentage					90	90	90	90	90
N8 8th spindle speed					15,000	16,000	16,000	17,000	17,000
B8 Wound percentage					95	95	95	95	95
N9 9th spindle speed					14,000	15,000	15,000	16,000	16,000
B9 Wound percentage					98	98	98	98	98
Traveller number count	4 / 0	5 / 0	5 / 0	5 / 0	6 / 0	6 / 0	6 / 0	6 / 0	6 / 0

(2) Maximum target speed: 23,000 rpm

Spinning conditions:

- Combed yarn Ne 40
- Ring diameter ø36
- Lift 152 mm

Running-in steps	1	2	3	4	5	6	7	8	9	10	11
Max. spindle speed (rpm)	16,000	17,000	18,000	19,000	20,000	20,500	21,000	21,500	22,000	22,500	23,000
N0 Initial spindle speed	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000	15,000
N1 1st spindle speed	15,500	16,000	16,000	16,000	16,000	16,500	16,500	16,500	16,500	16,500	16,500
B1 Wound percentage	20	5	5	5	5	3	3	3	3	3	3
N2 2nd spindle speed	16,000	16,500	16,500	16,500	16,500	17,000	17,000	17,000	17,000	17,000	17,000
B2 Wound percentage	40	40	30	10	10	5	5	5	5	5	5
N3 3rd spindle speed		17,000	17,000	17,000	17,000	18,000	18,000	18,000	18,000	18,000	18,000
B3 Wound percentage		50	40	20	20	10	10	10	10	10	10
N4 4th spindle speed		17,000	18,000	18,500	18,500	19,000	19,000	20,000	20,000	20,000	20,000
B4 Wound percentage		95	50	30	30	15	15	15	15	15	15
N5 5th spindle speed		16,000	18,000	19,000	19,000	20,000	20,000	20,500	20,500	20,500	20,500
B5 Wound percentage		98	95	50	40	20	20	20	20	20	20
N6 6th spindle speed			16,000	19,000	20,000	20,500	20,500	21,000	21,500	21,500	21,500
B6 Wound percentage			98	95	50	30	30	30	40	40	40
N7 7th spindle speed				18,000	20,000	20,500	21,000	21,000	22,000	22,500	23,000
B7 Wound percentage				98	95	50	50	50	50	60	70
N8 8th spindle speed					19,000	20,500	21,000	21,500	22,000	22,500	23,000
B8 Wound percentage					98	95	95	95	95	95	95
N9 9th spindle speed						19,000	20,000	20,000	20,000	20,000	21,000
B9 Wound percentage						98	98	98	98	98	98
Traveller number count	9 / 0	9 / 0	9 / 0	10 / 0	10 / 0	10 / 0	11 / 0	11 / 0	11 / 0	11 / 0	11 / 0

6.1A.2 Preparation

(3) Maximum target speed: 25,000 rpm

Spinning conditions:

- Combed yarn Ne 40
- Ring diameter ø36
- Lift 152 mm

Running-in steps	1	2	3	4	5	6	7	8	9	10	11
Max. spindle speed (rpm)	18,000	19,000	20,000	21,000	22,000	22,500	23,000	23,500	24,000	24,500	25,000
N0 Initial spindle speed	17,000	17,000	17,000	17,000	17,000	18,000	18,000	18,000	18,000	18,000	18,000
N1 1st spindle speed	17,500	18,500	18,500	18,500	18,500	19,500	19,500	19,500	19,500	19,500	19,500
B1 Wound percentage	20	5	5	5	5	3	3	3	3	3	3
N2 2nd spindle speed	18,000	19,000	19,500	19,500	19,500	20,000	20,000	20,000	20,000	20,000	20,000
B2 Wound percentage	40	50	10	10	10	5	5	5	5	5	5
N3 3rd spindle speed		19,000	20,000	20,000	20,000	21,000	21,000	21,000	21,000	21,000	21,000
B3 Wound percentage		95	50	40	30	20	10	10	10	10	10
N4 4th spindle speed		18,000	20,000	21,000	21,000	21,500	21,500	21,500	21,500	21,500	21,500
B4 Wound percentage		98	95	50	40	15	20	20	20	20	20
N5 5th spindle speed			18,000	21,000	22,000	22,000	22,000	22,000	22,000	22,500	22,500
B5 Wound percentage			98	95	50	40	30	30	40	40	40
N6 6th spindle speed				20,000	22,000	22,500	22,500	22,500	23,000	23,500	23,500
B6 Wound percentage				98	95	50	40	40	50	50	50
N7 7th spindle speed					20,000	22,500	23,000	23,500	24,000	24,500	25,000
B7 Wound percentage					98	95	50	60	60	70	70
N8 8th spindle speed						20,000	23,000	23,500	24,000	24,500	25,000
B8 Wound percentage						98	95	95	95	95	95
N9 9th spindle speed							21,000	21,000	21,000	22,000	22,000
B9 Wound percentage							98	98	98	98	98
Traveller number count	10 /0	10 /0	10 /0	11 /0	11 /0	11 /0	11 /0	12 /0	12 /0	12 /0	12 /0

[2] Parts, Components, Tools and Jigs to be Prepared

Before going into the practical production, complete the following preparations for smooth practical production:

- (1) Procure the required amount of roving.
- (2) Procure the required number of bobbins. (to be classified by color)
- (3) Set up travellers having almost the same number count and shape as for those used in the test run.
- (4) Procure the following:
 - Spare top rollers (front and back)
 - Spare rubber aprons (top and bottom) and cradles
 - Spare collectors (if collectors are to be used)
- (5) Set up the winder and procure the following:
 - Cheese bobbins (normal type or heat-setting type)
 - Wax for knitting yarn
- (6) Set up the air conditioner.
- (7) Procure lubricants by referring to Section M.1A.
- (8) Procure the tools and jigs required for daily and periodical cleaning.

6.1A.3 Spinning Condition Setting

[1] Setting the Spindle Speed Change Program

In order to produce high-quality spun yarn from the start to the end of winding, the RX should change the spindle speed according to the current wound percentage.

The RX is capable of changing the spindle speed up to 10 shifts in a sequence of spinning. The table below lists the speed change program examples. Refer to this table when setting your own speed change program.

Spindle speed change program examples

Roving	Cotton	Cotton	Cotton	Cotton	Cotton	Cotton	Cotton
Yarn number count (Ne)	20	30	40	50	40	40	40
No. of twists per inch (TPI)	16.99	19.17	23.45	25.45	23.53	24.30	25.90
Lift length (inch)	7	7	6	6	7	6	6
Ring bore dia. (mm)	44	44	36	36	41	36	36
Traveller number count	No.3	2/0	6/0	10/0	6/0	12/0	12/0
N0	11,000	12,000	15,000	14,000	13,700	15,000	18,000
ACC1	2,000	2,000	2,000	1,500	2,000	2,000	2,000
N1 ()	11,500 (5)	13,000 (5)	16,000 (10)	15,000 (5)	14,500 (4)	16,500 (3)	19,500 (3)
N2 ()	12,000 (10)	13,500 (20)	17,000 (20)	16,000 (40)	15,000 (30)	17,000 (5)	20,000 (5)
N3 ()	12,500 (40)	14,000 (30)	17,500 (30)	16,000 (60)	16,100 (43)	18,000 (10)	21,000 (10)
N4 ()	12,500 (90)	14,500 (40)	18,000 (40)	15,500 (95)	17,000 (48)	20,000 (15)	21,500 (20)
N5 ()	12,000 (95)	14,500 (90)	18,000 (95)	14,000 (97)	17,000 (88)	20,500 (20)	22,500 (40)
N6 ()	11,000 (97)	14,000 (95)	17,000 (97)		15,800 (98)	21,500 (40)	23,500 (50)
N7 ()		13,000 (97)				23,000 (70)	25,000 (70)
N8 ()						23,000 (95)	25,000 (95)
N9 ()						21,000 (98)	22,000 (98)

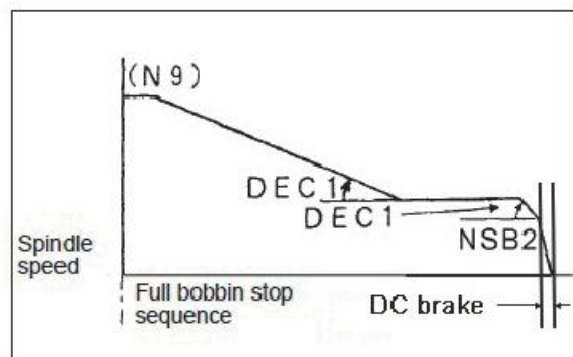
[2] Anti-snarl Sudden Brake

The anti-snarl sudden brake prevents snarls from occurring by changing the deceleration slope to bring the main motor to a sudden stop when RX comes to a full-bobbin stop.

[2.1] Induction motor type

The induction motor type RX apply DC brake to main motor by inverter when it comes to a full bobbin stop.

Apply DC brake when the spindle speed reaches NSB2 in a deceleration process.



Set items for a full-bobbin stop	Reference values
NSB2 (rpm)	1200
DEC1 (rpm/sec.)	1000
DEC2 (rpm/sec.)	2500

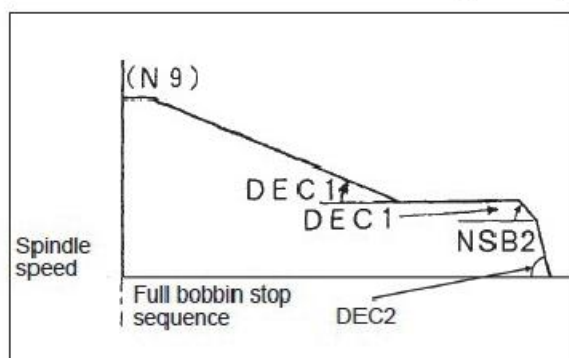
REFERENCE: For the detailed adjustment procedure, refer to Section 4.1 and Section 7.1.

[2.2] Energy-saving motor type

The energy-saving motor type RX stops suddenly by changing the deceleration slope when it comes to a full bobbin stop.

This is achieved by switching to DEC2 of deceleration rate after the spindle speed reaches NSB2 in a deceleration process.

The deceleration rate DEC2 can be adjusted by editing the setting.



Set items for a full-bobbin stop	Reference values
NSB2 (rpm)	1200
DEC1 (rpm/sec.)	1000
DEC2 (rpm/sec)	2500

REFERENCE: For the detailed adjustment procedure, refer to Section 4.1 and Section 7.1.

[3] Setting the Bobbin Shape

The typical bobbin shape and its set values are given in Section 5.1A. However, they will differ depending upon the roving, yarn number count, lift length, ring bore dia. and others.

The table below lists the practical examples. Use this table as a guide for determining the set values.

After checking the bobbin shape produced in the test run, make fine adjustment.

Set items	Symbol	Examples				
Bobbin dia. (bottom)	DE1	27.0	27.0	27.0	25.0	25.0
Bobbin dia. (top)	DE2	21.0	21.0	21.0	19.0	19.0
Total lift length	Lt	180	180	180	150	150
Ring bore dia.	R	44	44	41	36	36
Chase length	C	54	50	47	42	42
Yarn number count	Ne	20	30	30	40	40
Yarn pitch	K	7.0	7.0	7.0	4.8	7.5
Yarn weight	G	82	80	55	34	33
Twist multiplier	TM	4.16	3.55	3.70	3.56	3.84

REFERENCE: For the bobbin shape setting procedure, refer to Section 5.1A.

[4] Setting the Yarn Path

[4.1] Bobbin hangers

Each of the bobbin hangers integrates a coil spring which applies brake to the rotation of the bobbin hanger for smoothly supplying roving to the draft zone.

You should choose the appropriate type of the coil spring according to the roving to be used, roving weight, the required number of twists and other conditions. The table below lists a general guide for choosing coil springs.

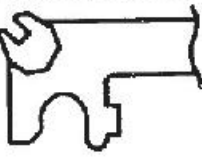
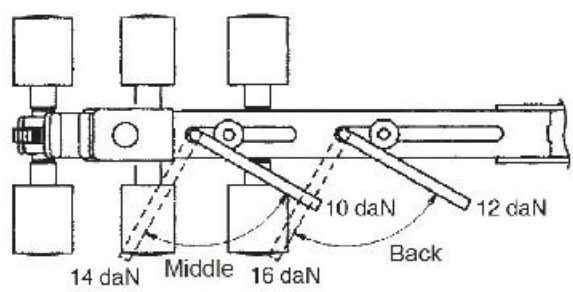
Autotex Name	KHK (KANPATSU KOGYO) Brake power of coil spring	[Reference value] Roving weight (cotton) [gr/30 yds]
Fine	3g	~200
Medium	4g	200~250
	5g	250~450
Coarse	6,7g	450~

[4.2] Load to the rollers

The greater the load to the rollers, the larger the binding force of fibers, resulting in accurate drafting. However, applying more load than necessary to the rollers will affect the rollers themselves and waste power.

Generally, to make the draft ratio higher, it is necessary to increase the load to the rollers. When increasing the load, take into account the hardness and material of rubber rollers, roving to be used, temperature and humidity.

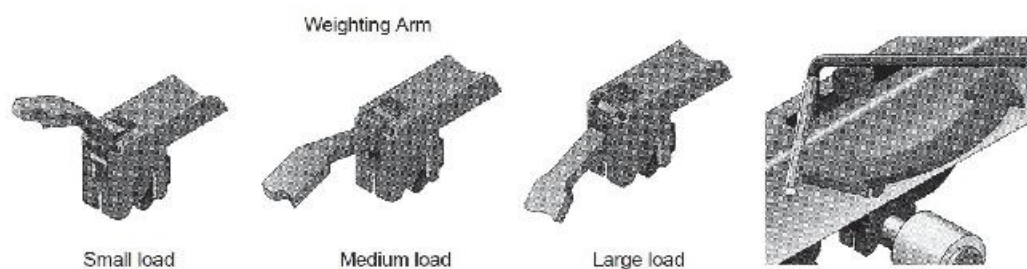
■ Listed below are the α100 weighting arms and their loads.

Arm type	Front rollers (daN)	Middle rollers (daN)	Back rollers (daN)
α100	6  Reducing position 10  14  18 	10 14	12 16
			

(daN=10 N ≒ 1 kgf)

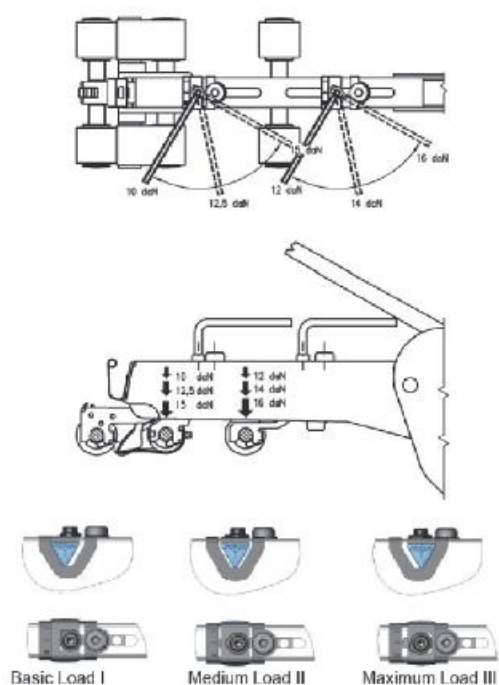
■ Listed below are the PK weighting arms and their loads.

Arm type	Front rollers (daN)	Middle rollers (daN)	Back rollers (daN)
PK2025	6 (White)		
	10 (Black)		
		10	12
	14 (Green)		
	18 (Red)	14	16



■ PK2130

Arm type	Front (daN)	Middle (daN)	Back (daN)
PK2130	10(Black)	10	12
	12(Black/Green)		
	14(Green)	12.5	14
	16(Green/Red)		
	18(Red)	15	16



[4.3] Distance clips

■ TexParts distance clips

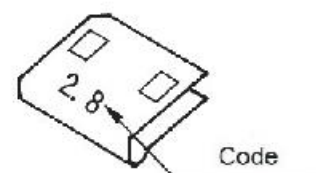
(Unit: mm)

Clip		Red	Yellow	Light purple	White	Gray	Black	Beige	Green
Cradle									
Short Cradle OH 2022		—	2 . 2	2 . 5	2 . 8	3 . 3	3 . 8	—	—
Yarn number count required (Ne)	~6								
	~10								
	~20								
	~30								
	~40								
	40 ~								
Medium Cradle OH 2042		2 . 5	2 . 9	3 . 3	3 . 8	4 . 1	4 . 6	5 . 8	6 . 1
Yarn number count required (Ne)	~6								
	~10								
	~20								
	~30								
	~40								
	40 ~								

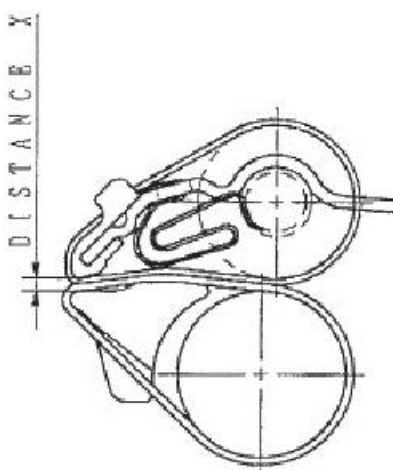
■ KANPATSU distance clips

KS Cradle		Code	2 . 5	2 . 8	3 . 1	3 . 4	3 . 7
Cradle							
KSS-35T Gage(mm)			2 . 5	2 . 8	3 . 1	3 . 4	3 . 7
Yarn number count required (Ne)	~12						
	16 ~ 20						
	30 ~ 40						
	60 ~ 80						
	80 ~						

KS Cradle



- The table below shows the interspaces (DISTANCE X) obtained when the distance clip is fitted on OH cradles.



Clip and distance correspondence table

CRADLE		SHORT		MEDIUM	
DISTANCE CLIP		OH2122	OH2022	OH2142	OH2042
COLOR	PARTS No.	DISTANCE X mm			
	TexParts				
RED	R3432-21010-00	—	—	2.4	2.4
CHROM YELLOW	R3432-21210-00	—	1.9	2.6	2.6
YELLOW	R3432-21020-00	—	2.2	2.8	2.8
LILAC	R3432-21030-00	2.5	2.5	3.2	3.2
WHITE	R3432-21040-00	2.8	2.8	3.5	3.5
LIGHT GREEN	R3432-21220-00	3.1	3.1	3.9	3.9
GRAY	R3432-21050-00	3.3	3.3	4.0	4.0
TURQUOISE	R3432-21230-00	3.6	3.6	4.5	4.5
BLACK	R3432-21060-00	3.8	3.8	4.6	4.6
ORANGE	R3432-21240-00	4.4	4.4	—	5.3
BEIGE	R3432-21070-00	4.8	4.8	—	6.0
GREEN	R3432-21080-00	5.5	5.5	—	6.6

[4.4] Balloon control rings

Balloon control rings prevent spun yarn from ballooning between snail wires and travellers, coming into contact with separators, and becoming broken. Depending upon the ring inside diameter (bore) and spinning speed, the size of balloon control rings should be chosen.

Determine the balloon control ring size depending upon the ring bore of your spinning frame by referring to the table below.

	I.D. of balloon control rings (mm)	42	44	46	47(Type D)	48	51	54	57
	Ring bore (mm)								
	36	○	○	○		/	/	/	/
	38	○	○	○	○		/	/	/
	41	/		○	○	○		/	/
	44	/	/	/		○	○	/	/
	45	/	/	/	/		○		/
	46	/	/	/	/		○	○	
	47	/	/	/	/	/	○	○	
	48	/	/	/	/	/		○	○
	50	/	/	/	/	/	/	○	○
	53	/	/	/	/	/	/		○

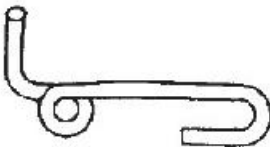
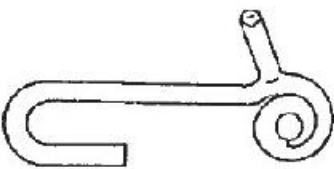
REFERENCE: In the above table, you could choose combinations not marked with ○, except for those marked with slant.

The higher the spindle speed, the larger inside diameter of balloon control rings recommended within the range marked with ○.

[4.5] Snail wires

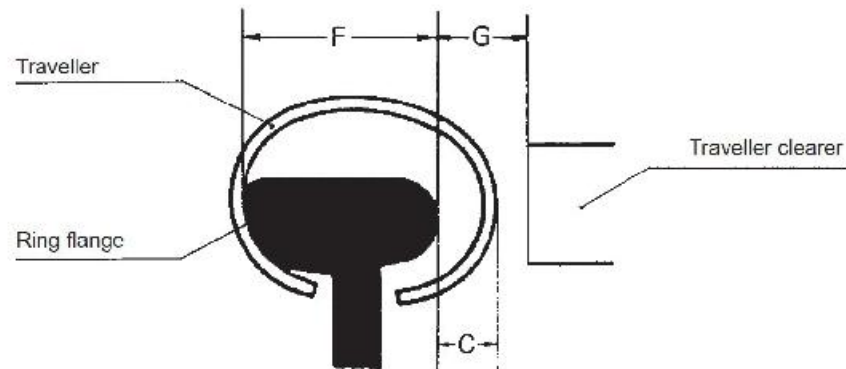
You should choose snail wires whose shape and material will not interfere with up-twisting. Using appropriate snail wires will lessen yarn breaks.

Determine the snail wire type depending upon the required yarn number count by referring to the table below.

Snail wire type	S&Z	Spiral
Shape		
Bore (mm)	2.0, 3.0, 4.0	2.0, 3.0, 4.0
Cross section of yarn path		
Remarks	Standard	Option

[4.6] Traveller clearer gage

The lower the yarn number count (the shorter the fiber length), the more the fly or fleece accumulating around the travellers, resulting in yarn breaks. To prevent the travellers from becoming covered with fly or fleece, you should accurately adjust the traveller clearer gage for stabilized spinning. Determine the traveller clearer gage (G mm) depending upon the traveller type used and traveller number count by referring to the table below.



Traveller clearer gage list (mm)

F width	2.5 (2.6) mm		3.2 (3.25) mm					
Tr type	OSS	OSS/hf	OSY	OSY/hf	OS	OSS/hf	Super OS	GS
Tr count								
11 ~ 20					2.9			2.8
6 ~ 10					2.5		2.4	2.2
1 ~ 5	2.2	2.1	2.0	1.9	2.4	2.4	2.3	2.1
1/0 ~ 5/0	2.0	1.9	1.6	1.4	2.1	2.0	1.9	1.7
6/0 ~ 10/0	1.8	1.7	1.5	1.3	1.9	1.8	1.7	1.5
11/0 ~ 15/0	1.7	1.5	1.4	1.2	1.7	1.5	1.5	1.3
16/0 ~ 20/0	1.6	1.4	1.4		1.5			1.2
21/0 ~ 25/0	1.6	1.3	1.3		1.3			1.2
26/0 ~ 30/0	1.5				1.1			1.1

F width	3.2 (3.25) mm							
Tr type	Super GS	YS-2	YS2/hf	MS/hf	ZS/hf	ZSB/hf	ZSC/hf	ZSA/hf
Tr count								
6 ~ 10	2.2			2.6	2.6		2.6	2.9
1 ~ 5	2.1	2.4	2.1	2.3	2.2	2.1	2.2	2.3
1/0 ~ 5/0	1.6	1.8	1.8	1.9	1.6	1.6	1.7	1.8
6/0 ~ 10/0	1.4	1.7	1.7	1.7	1.5	1.5	1.5	1.7
11/0 ~ 15/0	1.3	1.5	1.5	1.4	1.4	1.3	1.4	1.6
16/0 ~ 20/0		1.3	1.4		1.3			
21/0 ~ 25/0		1.2			1.3			

REFERENCE: For hf-w types, minus 0.1 mm from the values for hf types given above.

F width		3.2 (3.25) mm				4.0 (4.0) mm			
	Tr type		OY/hfn	OYH	PK/Hf	S	G	Super G	GF
	Tr count								
	21 ~ 30						4.1		
	16 ~ 20					2.9	3.8		4.6
	11 ~ 15				3.8	2.5	3.2	3.0	4.3
	6 ~ 10	3.0	3.2	3.7	3.4	2.1	2.9	2.8	3.6
	1 ~ 5	2.8	2.8	3.3	2.8	1.8	2.6	2.4	3.0
	1/0 ~ 5/0	2.7	2.6	3.0	2.7	1.3	2.1	1.9	2.4
	6/0 ~ 10/0	2.6	2.5		2.6	1.2	2.0		2.1
	11/0 ~ 15/0	2.5				1.0	1.8		
	16/0 ~ 20/0					1.0	1.7		
	21/0 ~ 25/0					0.9	1.6		
	26/0 ~ 30/0					0.7	1.4		

F width		4.0 (4.0) mm						
	Tr type	O	O/hf	Super O	OH	Z/hf	BZ/hf	YZ/hf
	Tr count							
	21 ~ 30	4.1					3.8	3.5
	16 ~ 20	3.8			5.0	3.5	3.5	3.4
	11 ~ 15	3.3		3.2	4.7	3.1	3.2	3.2
	6 ~ 10	3.0	3.2	3.0	4.0	2.5	3.0	2.8
	1 ~ 5	2.5	2.4	2.5	3.2	1.8	2.7	2.3
	1/0 ~ 5/0	2.0	1.9	1.8	2.5	1.6		
	6/0 ~ 10/0	1.8			2.2			
	11/0 ~ 15/0	1.7						
	16/0 ~ 20/0	1.5						
	21/0 ~ 25/0	1.3						
	26/0 ~ 30/0	1.1						

(Quoted from KANAI data.)

6.1A.4 Operation Management

[1] Process Control

It is important to establish your technical standard, workmanship standard and inspection standard and observe them for stabilized spinning process.

You should not modify the reference values stipulated in those standards unnecessarily. If modification is required, revise the standards.

[1.1] Technical standard (Reference)

Number of twists per inch		Top-roller weight ($F \times M \times B$)	
Cop weight (g) $\times$ Cop dia. (mm)		Collector	
Ring bore (mm)		Bottom apron	
Average spindle speed (rpm)		Top apron	
Roller gage ($F \times B$)		Front top-roller dia. range	
Break draft		Traveller	
Total draft		U%	
Tenser gage and clip type		Unevenness of gray yarn (%)	

[1.2] Workmanship standard and inspection standard (Reference)

Work type	Object components	Procedure			
		To be done by	At this interval	What to do	To be inspected by
Cleaning	Whole RX	Periodical cleaning team	Once/20 days	Check that the collectors are not loose fitted, the cradles are not deformed, or the bottom rollers are not loose.	Maintenance administrator
	Roll pickers	Picker team	Every day	Check also the inside of the cradles.	Maintenance administrator
	Back top-rollers	Clearer team	Every day	Wipe off accumulation from the back top-rollers and check them for scratches.	Operation administrator
	Clearers	Clearer team	Every day	Clean all of the spindles.	Maintenance administrator
Inspection	Surface of roving	QC team	Once/shift	Check that there is no abnormally thick or thick sections or no foreign materials in roving.	Operation administrator
	Roller parts	QC team	Once/shift	Check that the aprons are in place and its traverse width is normal.	Maintenance administrator
	Collectors	QC team	Every day	Check the collectors are not disengaged or covered with eyebrow.	Maintenance administrator
	Trumpets	QC team	Every day	Check that the trumpets are not clogged with fly or fleece.	Maintenance administrator
Other jobs	Travellers	Periodical cleaning team	Once/20 days	Check the yarn number count and the traveller replacement interval.	Operation administrator
	Unevenness of gray yarn	QC team	Every day	Check whether the roving unevenness is within 1.5%.	Operation administrator

[1.3] Rubber roller maintenance standard (Reference)

Roller type	Size	Roller replacement interval	Polishing interval	Rubber change interval	Material and hardness
Front rollers					
Back rollers					

[1.4] Rubber apron maintenance standard (Reference)

Apron type	Size	Cradle cleaning interval	Apron replacement interval	Material
Top aprons				
Bottom aprons				

[1.5] Ambient temperature and humidity

The ambient temperature and humidity cannot be absolutely determined due to the weather of the factory location, conditions of the location, building structure and air conditioning. The table below lists the recommended temperature and humidity.

Process		Blending	Carding	Combing	Drawing	Roving	Spinning	Winding
Material	Temperature & humidity							
Cotton	Temperature	24 - 30℃						
	Humidity	45 - 60%	45 - 55%	60 - 65%	50 - 65%	50 - 60%	50 - 55%	60 - 70%
Polyester/cotton	Temperature	24 - 30℃						
	Humidity	55 - 60%	55 - 60%		55 - 60%	55 - 60%	55 - 60%	65 - 70%
Rayon/Rayon blend	Temperature	24 ~ 30℃						
	Humidity	70 - 75%	60 - 65%		60 - 65%	60 - 65%	55 - 60%	65 - 70%
Polyester	Temperature	24 - 30℃						
	Humidity	60 - 70%			55 - 65%		60 - 65%	60 - 70%
Acrylic	Temperature	24 - 30℃						
	Humidity	60 - 70%	55 - 65%		58 - 65%		56 - 62%	60 - 70%

[1.6] Posting up the spinning system and yarn number counts

For directing the operation management, it is necessary to post up the spinning system and yarn number counts.

The spinning system is composed of the stock roving classification, production facility classification and product application classification. Posting up the spinning system flow enables you to manage the production volume and efficiency at each process, to control the quality of intermediate products (e.g., lap, sliver, roving and cops) and final products (e.g., cheeses and cones), and to troubleshoot for errors easily at the time of occurrence.

Post up the yarn number count of the current spinning on each of the spinning system flows or on each of the RXs in order to prevent troubles from occurring due to the confusion of yarn number counts. This is required since RXs spin yarns of several yarn number counts out of the same roving and adjacent RXs spin yarns of different yarn number counts.

[2] Quality Control

[2.1] Quality of spun yarn

Periodically check to see that the quality of spun yarn is within the stipulated criteria in respect of each of the properties. If any problem is noted, immediately take the necessary recovery action (see Subsection 6.1.4 [2.2]).

The table below lists the criteria of the number of samples and checking intervals to be applied.

However, you should check the properties of spun yarn also in any of the following cases: - when the yarn quality is not stabilized. - when any of the stock roving lot, production facilities, process setting conditions, and the required yarn number count is modified.

Properties	Number of samplings	Checking interval	Measuring instruments
Yarn number count (Grain) Unevenness of yarn thickness	40 cops $\times$ 1 time/cop = 40 times	Once/day to Once/2 days	• Uster Autosorter
Strength of single yarn, Extension strength, Variation in strength, Lea breaking strength	10 cops $\times$ 5 times/cop = 50 times For polyester/cotton 5 cops $\times$ 12 times/cop = 60 times	Once/week to Once/month	• Single-yarn Tester • Uster Tensorapid • Uster Tensojet
Unevenness (U%, CV%) Defects (I.P.I)	5 cops $\times$ 1 time/cop = 5 times	Once/day to Once/week	• Uster Tester 4 or 5
Number of twists (TPI) Unevenness of twist	5 cops $\times$ 8 times/cop = 40 times	Once/week	• Twist tester
Fluff Unevenness of fluff	20 cops $\times$ 1 time/cop = 20 times	Once/day to Once/week	• Uster Tester 4 or 5 with hairiness module • ZWEIGLE G566
Frequency of defects	20 cops $\times$ 1 time/cop = 20 times	Once/month	• Uster Classimat = CMT

Example 1: 40 cops $\times$ 1 time/cop = 40 times

Use 40 cops and check them once per cop so as to sample yarn a total of 40 times.

Example 2: 5 cops $\times$ 12 times/cop = 60 times

Use 5 cops and check them 12 times per cop so as to sample yarn a total of 60 times.

■ 100% Cotton (CM) User Statistics 2007 Table (Bobbin/Weaving)

			U%	CV%	Thin	Thick	Neps	Hairiness	Single yarn, strong	Rkm	Ductility
CM20	Ordinary yarn	5%	8.0	10.0	0.9	5.9	11.1	4.6	619.5	21.4	6.7
		25%	8.6	10.7	0.3	10.9	18.5	5.0	—	19.5	6.4
		50%	9.4	11.7	0.8	21.4	30.2	5.6	506.5	17.6	5.9
		75%	10.0	12.5	2.0	39.8	54.7	6.1	—	16.3	5.5
		95%	11.0	13.7	5.3	105.0	115.6	6.6	400.4	15.0	4.9
	Compact yarn	5%	7.8	9.8	0.1	2.8	8.3	3.5	740.9	23.2	8.0
		50%	8.5	10.6	0.1	6.9	17.5	4.2	566.4	19.5	6.7
		95%	9.3	11.6	0.3	18.4	42.4	5.2	433.0	16.6	5.8
CM30	Ordinary yarn	5%	9.0	11.2	0.8	9.2	19.8	4.0	423.5	21.8	6.6
		25%	9.7	12.1	1.0	17.6	33.9	4.4	—	19.8	6.1
		50%	10.4	13.0	2.2	35.3	56.2	4.9	338.6	18.0	5.6
		75%	11.2	14.0	5.4	68.8	105.0	5.3	—	16.6	5.2
		95%	12.4	15.5	13.5	244.9	256.3	6.0	276.8	15.3	4.7
	Compact yarn	5%	8.6	10.7	0.3	5.4	14.9	3.1	512.2	24.2	7.2
		50%	9.2	11.5	0.6	12.1	27.8	3.6	396.0	20.4	6.2
		95%	10.0	12.5	1.1	28.1	58.1	4.3	306.1	17.3	5.4
CM40	Ordinary yarn	5%	9.8	12.2	0.7	12.6	29.8	3.6	323.7	22.0	6.3
		25%	10.6	13.2	2.2	24.7	52.1	4.0	—	20.0	5.8
		50%	11.3	14.1	4.6	50.3	87.1	4.4	255.9	18.2	5.4
		75%	12.2	15.2	11.1	101.3	166.4	4.8	—	16.9	5.0
		95%	13.4	16.8	26.1	445.6	449.9	5.6	211.6	15.5	4.5
	Compact yarn	5%	9.0	11.3	0.9	8.8	22.4	2.8	396.0	24.9	6.8
		50%	9.8	12.2	1.6	18.0	38.7	3.2	309.6	21.0	5.8
		95%	10.6	13.3	3.0	37.9	72.6	3.7	242.0	17.8	5.1
CM50	Ordinary yarn	5%	9.3	11.6	0.7	9.5	24.4	3.0	309.6	26.5	6.4
		25%	9.8	12.3	2.2	20.3	50.1	3.5	—	23.8	5.8
		50%	10.4	13.0	4.7	33.1	85.1	3.9	250.3	20.9	5.3
		75%	11.3	14.1	9.6	69.5	147.5	4.3	—	18.0	4.9
		95%	12.4	15.5	29.4	179.3	412.0	5.3	197.9	15.9	4.4
	Compact yarn	5%	9.5	11.9	1.9	12.8	30.7	2.6	323.7	25.4	6.4
		50%	10.2	12.8	3.3	24.6	49.9	2.9	255.9	21.5	5.6
		95%	11.0	13.8	6.3	47.7	86.3	3.4	200.1	18.2	4.9
CM60	Ordinary yarn	5%	9.8	12.3	2.0	16.9	36.2	2.9	250.3	25.6	6.1
		25%	10.5	13.1	5.3	32.1	65.7	3.3	—	23.3	5.6
		50%	11.0	13.8	10.2	49.3	104.8	3.6	206.3	20.8	5.2
		75%	11.8	14.8	19.2	91.7	168.6	4.0	—	18.3	4.8
		95%	12.9	16.1	49.1	201.2	390.8	4.8	169.2	16.5	4.4
	Compact yarn	5%	9.9	12.4	3.6	17.4	40.0	2.4	273.7	25.9	6.1
		50%	10.6	13.3	6.3	31.7	61.7	2.7	216.4	22.0	5.4
		95%	11.4	14.3	11.7	57.8	99.6	3.1	171.7	18.6	4.7
CM80	Ordinary yarn	5%	10.9	13.6	10.9	41.5	66.8	2.7	183.0	24.3	5.7
		25%	11.4	14.3	20.4	65.4	100.3	3.0	—	22.6	5.3
		50%	12.1	15.1	33.9	91.7	145.1	3.3	153.0	20.6	5.0
		75%	12.8	16.0	56.6	141.2	207.6	3.5	—	18.8	4.7
		95%	13.7	17.1	109.4	240.9	359.8	4.0	132.3	17.4	4.4
	Compact yarn	5%	10.6	13.2	9.8	28.2	60.2	2.2	211.6	26.6	5.7
		50%	11.3	14.1	16.9	47.3	85.7	2.4	169.2	22.7	5.1
		95%	12.1	15.1	30.8	77.9	124.5	2.7	135.3	19.1	4.5

NOTE: $U\% = CV_m/1.25$

The strength and ductility data are tensor rapid data. Note that Tensor Jet data are different.

[2.2] Yarn defects and corrective actions

Defect type	Defects	Probable causes	Corrective actions to be taken
Twist-related defects	Unevenness of twist (Twist irregularity)	1) Yarn unevenness. 2) The spindle speed is not stable due to the improper tension or positioning of the drive tape (belt). 3) The bobbins or spindles have fluctuated. Or, the bobbins are not fitted into place.	1) Decrease the yarn unevenness. 2) Correct the tension and position of the drive tape (belt). 3) Replace the defective bobbins or spindles. Fit the bobbins into place.
	Too hard twist (Low yarn number count)	1) Sliver: Unevenness (thicker) Roving: Unevenness of twist 2) Roving has slipped off the back top-rollers so that no break draft occurs. Or either of the rollers is entangled with roving. 3) The front top-rollers are lacking grease or are entangled.	1) Check and adjust the rollers used in the drawing and roving processes. 2) Adjust the position of the trumpets. Class the cops relating to the entangled roller into another lot or remove the defective yarn section. 3) Correct the lubrication interval and clean then rollers and their surroundings.
	Too soft twist (High yarn number count)	1) The spindle speed is not stable due to the improper tension or positioning of the drive tape (belt). 2) The bobbins or spindles have fluctuated or they have been burnt out. Or the bobbin are not fitted into place. 3) Sliver: Unevenness (thinner) Roving: Unevenness (thinner portion continued)	1) To make the tension of the drive tape (belt) constant: • Check whether the tension device swings sufficiently. • Check whether the tension pulley rotates lightly. • If the tension load is insufficient so that the drive tape (belt) is slipping, change the position of the weight to increase the tension. 2) Replace the defective bobbins or spindles. Fit the bobbins into place. • Correct the lubrication interval. 3) Correct the lubrication interval for the drawing top rollers or optimize the load.
	Twist shrinkage	1) Twisting has been too hard partially. 2) If twist shrinkage occurs during spinning of hard twist yarn, the yarn tension at the start or stop of the RX has been too low.	1) Decrease the yarn unevenness. 2) Before the start of running, adjust the yarn tension correctly. Check the traveller number count.

Defect type	Defects	Probable causes	Corrective actions to be taken
Fluff-related defects	Fluffy yarn	1) The yarn has undergone mechanical friction continually in the spinning or winder process due to a spindle rotation fault, ring/traveller defective, mismatch between the rings and travellers, drum defective, or guide defective. 2) Static electricity has arisen during spinning operation. 3) The cops have been rubbed due to rough handling. 4) The cops have been rubbed during transportation due to poor packing.	1) Set the spindle speed matching the ring bore and lift length, replace the defective parts, and adjust the gages. Choose the optimum type of travellers. 2) Condition the humidity in the spinning room and use antistatic agent. 3) Strictly observe the workmanship standard. 4) Observe the packing standard and improve the packing job.
	Rubbed yarn (on cops or cheeses)	1) The cops have been in contact with the rings due to yarn thickness, fluctuation of spindles, wrong spindle gage, or hopping of bobbins. 2) The cheeses have rotated with their same sides being in contact with the drums for a long time. 3) The rotation of the cheeses are not smooth relative to the rotation of the drums. 4) The cops have been rubbed during transportation due to poor packing.	1) Adjust the spindle gage, replace defective spindles or rings, or remove defective bobbins. 2) Adjust the yarn-break stop motion. 3) Remove defective cheese bobbins. Correct the bobbin holder bearings. 4) Observe the packing standard and improve the packing job.
	Uneven fluff	1) When the ring rail was in the bottom position, ballooning has become excessively large so as to bring yarn into contact with separators, which makes the traveller rotation unsmooth. 2) The spinning rings are out of position. 3) Cops have been rubbed during transportation due to poor packing.	1) Install balloon control rings or set the spindle speed matching the ring inside diameter and length. 2) Adjust the spindle gage. 3) Observe the packing standard and improve the packing job.

Defect type	Defects	Probable causes	Corrective actions to be taken
Nep- and slub-related defects	Nep	1) The raw stock contained a lot of nep. Because of the property of the raw stock, nep was easily produced. 2) The opening and picking were overdone or insufficient. (Overdoing will result in an excessive amount of nep.) 3) The comber has not been set up properly. 4) The rings and travellers are not matched.	1) Choose appropriate raw materials. 2) Change the gage or picking to obtain the optimum opening state. 3) Sharpen the card clothing earlier. Optimize the gage, combing speed, and waste percentage. 4) Replace the defective rings or travellers. Choose the optimum traveller number count.
	Leaf and other trash	1) After the roving has been spun, some flat clump of roving has remained. Or, fibers have adhered together so as to become unseparable. 2) Leaf and other trash have not been removed during the spinning process.	1) Choose the optimum raw materials. 2) During the opening, picking and combing processes, remove leaf and other trash without fail.
	Fly or fleece twisted together	Fly, fleece, clearer dust, cut end, or other waste is attached to or twisted with spun yarn.	Optimize the cleaning interval, equip the factory with the pneumatic clearer, or take necessary actions when cleaning the ceiling.
	Kinky yarn	1) The raw material contained abnormally long fibers. 2) The roller gage is narrow. 3) The aprons are too hard. 4) The ambient temperature is too low.	1) Strictly check the raw material in the acceptance inspection. 2) Investigate the fiber length and optimize the roller gage. 3) Periodically check the aprons and replace defective ones. 4) Air-condition the factory.
	Slub	1) The opening and the degree of parallelization of roving or sliver were insufficient. 2) Clumps of fly or fleece have accumulated on roving. 3) Ties of roving are faulty. 4) Bottom rollers entangled with fly or fleece, Inside of the aprons covered with cotton waste, Traverse guides or sensors clogged with cotton. 5) Aprons defective. (They are too hard or short, causing unsmooth rotation.) 6) Cradles defective. (The cradles have been deformed or the right and left cradle springs are different from the other.) 7) Rollers defective. (The fluted roller pressure is faulty. The roller gage is wrong.)	1) Direct the optimum process management to improve the opening and the degree of parallelization. 2) Carry out a thorough cleaning and optimize the cleaning intervals. 3) Strictly observe the roving tie-up workmanship standard. 4) Check the draft zone to isolate the error source, then remove accumulation of fly, fleece or cotton waste. 5) Replace the defective aprons. 6) Replace the defective cradles. 7) Repair or replace the defective parts.

Defect type	Defects	Probable causes	Corrective actions to be taken
Size unevenness related defects	Twist irregularity	1) The rollers have been fluctuated or rotated eccentrically. 2) The rotation of the rollers have been unsmooth. 3) The aprons or top rollers are defective.	1) Periodically check the rollers and repair the defective sections. 2) Check the gears for engagement and wear, then adjust or replace the gears. 3) Periodically check the aprons and top rollers, then replace the defective ones.
	Slight unevenness	1) The drafting conditions or supplied roving was improper. 2) Aprons defective. 3) The roller gage or draft mechanism was improper.	1) Taking into account the properties of the fibers (fiber length and fineness), adjust the roller gage and drafting conditions. 2) Manage the length, elasticity, thickness and hardness of the aprons. 3) Choose the optimum draft mechanism.
	Great unevenness	1) Roving or sliver has been slightly uneven. 2) The drafting roller gage or application of pressure was improper. 3) The rotation of the drawing top rollers is faulty. The rollers were lacking oil.	1) Optimize the roller gage, drafting conditions, twisting gears and bobbins. 2) Take into the properties of the fibers, then adjust the traverse and cradle load. 3) Manage the top rollers.
	Unevenness of yarn number count	1) The weight of the roving or sliver was uneven. 2) The drafting of the roving or sliver was insufficient. 3) The roller pressure was improper. 4) The moisture regain has excessively varied in the raw material and during process. 5) The management of the sliver was improper.	1) Investigate and adjust the lap unevenness, can setting-up, and drawing conditions. 2) Optimize the number of twists in roving, the bobbins, drafting conditions, and the sliver weight. 3) Taking into account the properties of the fibers and the thickness of sliver and roving, optimize the load. 4) Air-condition the material storage room and spinning room to optimize the weight management. 5) Remove sliver of the specified length or shorter and observe the can setting-up workmanship standard strictly.
	Abnormally thin yarn	1) Ties of roving or sliver are faulty. 2) Roving or sliver drafting is not proper. 3) Roving has been partially twined around the rollers and aprons. 4) Sliver licking.	1) Be careful with those ties. Prepare roving or sliver so that those tied sections will come to the end of a sequence of spinning, for removing abnormally thin portion. 2) Optimize the number of twists of roving or the weight of sliver, then adjust the creels. 3) Air-condition the spinning room and optimize lubricants and the surface treatment of the top rollers. 4) Optimize the sliver collecting or loading way.

6.1A.4 Operation Management

Defect type	Defects	Probable causes	Corrective actions to be taken
Size unevenness related defects	Abnormally thick yarn	1) Ties of roving or sliver are faulty. 2) Sliver unevenness (abnormally thick), twist irregularity, and involved twist. 3) Roving has slipped off the back top-rollers so that no break draft has occurred. 4) The front top-rollers have been entangled with roving or are lacking oil. Or either of the rollers is entangled with roving so that no main draft has occurred at the other side.	1) Be careful with those ties. 2) Adjust the rollers used in the drawing and roving processes to prevent abnormally thick yarn from yielding. For ties and involved twist, strictly observe the relating workmanship standard. 3) Adjust the trumpet gage. Class the cops relating to the entangled roller into another lot or remove the defective yarn section. 4) Clean the front top-rollers and their surroundings and optimize the lubrication intervals.
Mix spinning related defects	Unevenness of blended yarn	1) Yarn unevenness 2) Yarn dividing is insufficient. 3) The number of blended yarns is small. 4) The blending method is improper or the number of doublings is small.	1) Yarn unevenness may affect the blending ratio, so decrease the yarn unevenness by modifying the machine conditions. 2) Carry out sufficient yarn dividing and opening. 3) Choose the optimum yarn size. The lesser the number of blended yarns, the more the unevenness of blended yarn. 4) Use the appropriate blender.
	Wrong blending ratio	1) The blending ratio has varied due to the moisture regain. 2) Blending improper.	1) Before blending, measure and adjust the moisture regain, then measure the weight of roving. 2) When blending raw stock, take into account the waste percentage. Strictly observe the blending process workmanship standard.
	Foreign fibers mixed	1) The management of the cans or bobbins are poor. 2) Different types of roving have been mistakenly mixed in some process. 3) Different types of fibers floating around have been mixed.	1) Tint the cans and bobbins or keep them neat and tidy. 2) Systematize the RXs. 3) Control the air flow. Or, thoroughly clean the RXs at the time of roving type change.

Defect type	Defects	Probable causes	Corrective actions to be taken
Stains	Oil stains	1) During lubrication, repairing or other maintenance jobs, oil was splashed over yarn or it leaked out over yarn. 2) Workers' hands were dirty. 3) During the process, the yarn has slipped out of the specified yarn path. 4) Workers carelessly cleaned the RXs. 5) Yarn handling was improper.	1) Strictly observe the workmanship standard, optimize the amount of lubricant, and maintain the machinery and lubrication tools. 2) Make workers carry out hand-washing. 3) Take care not to let yarn slip out of the path. 4) Strictly observe the workmanship standard. 5) Clean the RXs and floor.
	Rust	Yarn has been stained with rust developed on the sections of the RXs.	Always maintain the yarn path and its surrounding sections which are likely to develop rust. Keep yarn away from rust.
	Smoked yarn	The factory air has been contaminated with soot and smoke coming from the outside. Fine yarn and large cops easily become smoky.	Equip the factory with air cleaners or air filters. When there is the possibility of the inflow of contaminated air, stop the air-conditioning carrier to temporarily quit taking in the open air.
	Contact with rings	Cops have come into contact with rings due to yarn thickness, fluctuation of spindles, wrong spindle gage, and popping out of bobbins.	Adjust the spindle gage, replace the defective parts, and repair the bobbins.
Color- and luster-related defects	Unevenness of color and luster	1) The raw materials in different color and luster have not sufficiently blended. 2) The lot management was poor, so the raw materials in different color and luster have been used.	1) Carry out sufficient blending. For example, apply the proper blending method and increase the number of doublings. 2) Direct the lot management based on the longterm planning.
	Different color (Unevenness of color)	The color of the raw material itself was uneven. Or, the blending of differently colored materials was uneven.	Carry out sufficient blending. For example, apply the proper blending method and increase the number of doublings.

(Quoted from the Fabric Technical Data.)

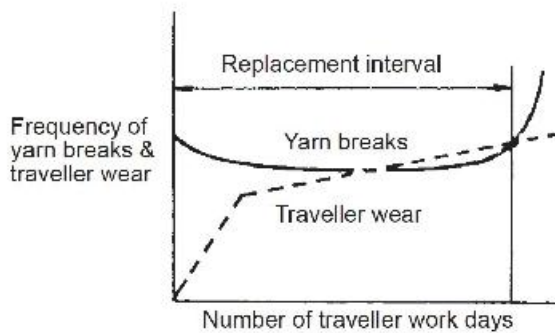
[3] Work Control

[3.1] Cleaning of RXs

The cleaning points and interval differ depending upon the fiber type, yarn number count, air conditioning, and cleaner automatization. The table below lists the cleaning criteria for producing combed yarn of medium yarn number count on the RX equipped with the pneumatic blow cleaner.

Cleaning points			Tools and procedure	Interval
Draft zone and rollers		1) Top roller arbors	Roller picker or take-up rod	Once/3 days
		2) Bottom roller necks		Once/shift
		3) Aprons		
		4) Cradles		
		5) Collectors		
Clearers		1) Top clearers 2) Bottom clearers	Vacuum cleaner for clearers Replace the current clearers with cleaned ones.	Once/3 days
Spindles and their surroundings		1) Spindle wharves	Hand picker, take-up rod, or hand brush	Once/3 days
		2) Bolsters	Slider plate	
		3) Ring plates		
		4) Lappets		
		5) Lifting pillars		
Creels and their surroundings		1) Hangers 2) Roving rods 3) Roving guides	Hand picker or take-up rod	Once/3 days
Spindle drive	Tape 4-spindle drive	1) Tension pulley	Hand picker or take-up rod (Be sure to stop the RXs for cleaning.)	Once/week
		2) Spindle drive pulley		
Around the RXs		1) GE 2) OE 3) MH	Hand brush	Once/2 days
Others		1) Floor 2) Ceiling	Floor brush	Once to twice/shift
			Special brush	Once/month
SCD	SCD body	1) Doffing bar (Gripper) 2) Lifter arm	Hand picker and hand brush	Once/2 days
	Peg tray	1) Transfer section at the OE 2) Turning section at the GE 3) Tray rail cover	Hand picker	Once/day

[3.2] Travellers



(1) Replacement interval of travellers (for replacing travellers all at once)

The replacement interval of the travellers differs depending upon the fiber type, yarn number count, and traveller type. As shown at left, however, it should be considered in correlation with the frequency of yarn breaks.

When 5 to 15% of the travellers' thickness have worn off, it is the most effective replacement time.

Typical traveller replacement interval

Fiber		Peripheral velocity	Hi-Ni travellers	Mega travellers
Cotton fiber	Medium & high number count	35.5 m/s	14 to 20 days	25 to 30 days
	Low number count	32 m/s	10 to 14 days	20 to 25 days
Cotton blended fiber	Medium & high number count	40 m/s	18 to 20 days	21 to 26 days
	Low number count	32 m/s	14 to 16 days	18 to 21 days
Chemical/synthetic fiber	Medium & high number count	32 m/s	17 to 18 days	21 to 27 days
	Low number count	28 m/s	15 to 16 days	20 to 25 days

(2) Traveller running-in

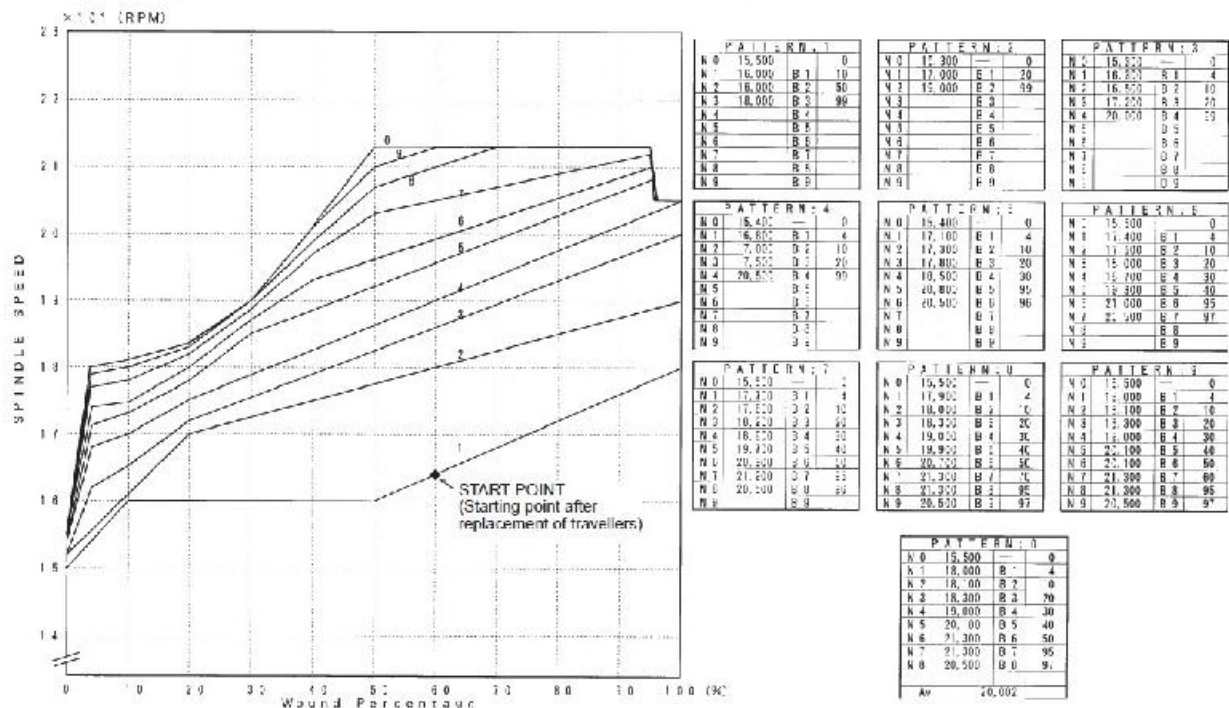
It is recommended that travellers be replaced all at once when the cops have been wound up to 50 to 70%.

After the replacement of travellers, run the RX at low speed for the specified period. This running-in will be effective in yarn quality, prevention of yarn breaks, and service life of travellers. Make up your own running-in plan matching the actual conditions by referring to the typical schedule given on the next page.

■ Setting example for the traveller running-in

Spindle Revolution Pattern	Pattern 0	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Average Speed	21,164	19,825	20,549	20,806	20,991
N0 Initial spindle speed	15,000	15,000	15,000	15,000	15,000
N1 1st spindle speed	16,500	16,500	16,500	16,500	16,500
B1 Wound percentage	3	3	3	3	3
N2 2nd spindle speed	17,000	17,000	17,000	17,000	17,000
B2 Wound percentage	5	5	5	5	5
N3 3rd spindle speed	18,000	18,000	18,000	18,000	18,000
B3 Wound percentage	10	10	10	10	10
N4 4th spindle speed	20,000	19,000	20,000	20,000	20,000
B4 Wound percentage	15	15	15	15	15
N5 5th spindle speed	20,500	20,000	20,500	20,500	20,500
B5 Wound percentage	20	20	20	20	20
N6 6th spindle speed	21,500	20,500	21,000	21,500	21,500
B6 Wound percentage	40	30	30	30	30
N7 7th spindle speed	23,000	20,500	21,500	22,000	22,500
B7 Wound percentage	70	95	50	50	60
N8 8th spindle speed	23,000	19,000	21,500	22,000	22,500
B8 Wound percentage	95	98	95	95	95
N9 9th spindle speed	21,000		20,000	20,000	21,000
B9 Wound percentage	98		98	98	98

■ Spindle speed shift pattern example in traveller running-in



[3.3] Yarn breaks during operation

It is very important to decrease the frequency of yarn breaks for increasing the productivity and improving the yarn quality.

(1) Spinning conditions

If yarn breaks occur frequently, immediately check the following:

	Check items	Possible error factors
1.	U% and weight of roving	• Roving defective • Poor quality and operation of the preceding process
2.	Temperature and humidity	• Air conditioning faulty (Refer to Subsection 6.1A.4 [1.5].)
3.	Wear condition of travellers	• Traveller service life expired
4.	Actual number of twists (displayed on the panel)	• Spindle drive belt slipping greatly • Lack of drive belt tension

(2) Yarn breaking state

If yarn breaks occur frequently, immediately check the following:

	Check items	Possible error factors
1.	Each cop • Yarn breaks at the start of winding • Yarn breaks at the end of winding	Traveller number count mischosen • Traveller too light • Traveller too heavy • Wrong setting of spindle speed
2.	R and L sides of RXs, and every RX	External factors • Blow cleaner blowing on the front rollers and their surroundings too hard • Traverse range not suitable • Lifting operation not normal
3.	Spindles on which frequent yarn breaks have occurred	• Spindle speed low on some of the spindles. • Spindles, balloon control rings, and snail wires wrongly centered or damaged. • Weighting arms lacking of pressure • Top rollers worn or damaged • Rings and travellers worn or damaged • Roving defective
4.	Yarn breaking state	• Roving tension too high • Ballooning (wrong setting of spindle speed or traveller number count mischosen)

(3) Actions to be taken against traveller-related yarn breaks

(Quoted from the KANAI data)

1. Rings

- Yarn breaks on particular spindles:

Check the ring surface and wear condition of travellers.

If no problem is noted, replace those rings by other rings having normal spindles;

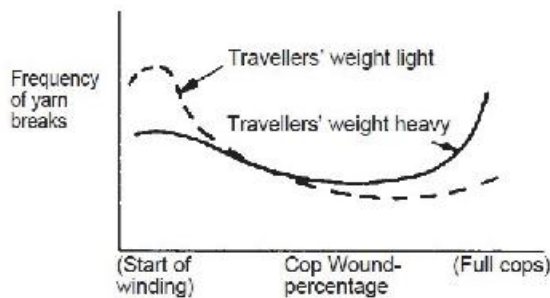
if any problem is noted, run in the rings or replace them.

- Yarn breaks on full bobbins:

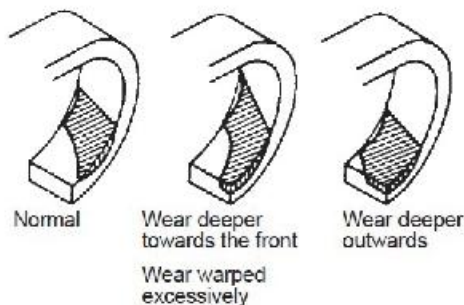
Adjust the spindle gage and snail wire gage.

- Yarn breaks on the overall spindles:

Run in the rings or replace them. Adjust the gages. Change the ring type or size.



Yarn Breaks According to Cop Wound-percentage



2. Travellers

[Yarn breaks at the start of winding]:

- Set higher traveller number count.

[Yarn breaks at the near full-bobbin]:

- Set lower traveller number count.

[Yarn breaks at the 30%-wound cops]:

- Change the traveller type.

3. Wear condition of travellers

[Wear deeper towards the front]:

- Choose the traveller type of smaller circle or choose the one having a low center of gravity.
- Oval-shaped travellers → the box-shaped ones.

[Wear warped excessively]:

- Replace the current travellers with ones of thicker section. Plain line → hf section line → nfw section line

[Wear deeper inwards]:

- Choose the smooth type.

[Wear deeper outwards]:

- Choose the traveller type of smaller circle.

4. Yarn breaks overall the RX

- Optimize the traveller replacement interval.

■ Reference Data

Yarn Break Check List for RXs				Checked on _____ (date)		Written by _____			
1. Your name		13. Top-roller hardness		14. Frame No.					
2. Country		15. Yarn quality	U%						
3. Model		IPI (1000 m)	THIN:	THICK:	NEP:				
4. Major specifications		16. Spindle speed change pattern 							
5. No. of frames installed									
6. Delivery date									
7. Raw material									
8. Yarn number count									
9. No. of twists									
10. Ring bore									
11. Traveller No.									
12. Anti-node ring I.D.									
17. Findings (to be classified according to the error factors and the occurrence time)									
Error factors	①	②	③	④	⑤	⑥	⑦	Total	Remarks
	High tension	Slub	Fly/fleece mixed	Tangled around snail wire	Pills due to travellers	Roving broken	Unknown		
Cop wound-percentage (Yarn length) 	Not tapered	Slub	Adhering fly/fleece	Entangled	Pills	Roving dia.	?		
10%									
20%									
30%									
40%									
50%									
60%									
70%									
80%									
90%									
100%									
Yarn breaks during normal operation _____ yams/1000H									
Yarn breaks at the start of running _____ yams/frame									spindles/ frame

6.1A.5 Reference Data

[1] Spinning Yarn Number Count and Number of Twists

[1.1] Total draft

The total draft is calculated by the graphic panel upon input of the roving weight (W), and yarn number count (Ne).

Input the draft correction (TDf) for adjusting the spinning yarn number count. See 7.1A “Operation Panel (Electronic Draft Specification)” for the graphic panel data entry method.

$$\text{Actual total draft} = \text{Desired total draft} \times \text{Draft correction (TDf)}/100$$

$$\text{Desired draft} = \text{Yarn number count (Ne)}/\text{Roving number count (Ne)}$$

$$\text{Twist shrinkage rate} = 0.06 \times \text{Twist coefficient (TM)}/3.4$$

REFERENCE:

$$\text{Roving number count (Ne)} = 250 \text{ gr}/\text{Roving weight (g)}/30 \text{ yds}$$

$$\text{Draft correction (TDf)} = 100/1 - 0.06 \times \text{Twist multiplier}/3.4 (\%)$$

Find the approximate value of “37.6705” in the draft gearing table and determine the number of teeth on the change gears.

NOTE: After setting the change gears, be sure to check actual spun yarn and make fine adjustment.

■ Reference data

Total draft calculated from roving weight and yarn count

$$D = \frac{W \times Ne}{250} \quad \text{or} \quad D = \frac{Ne}{HR}$$

Draft table between roving weight and yarn count

W Ne	30	40	50	60	70	80	90	100	110	120	130	140	150	160	170	180	190	200
4	0.48	0.46	0.80	0.96	1.12	1.28	1.44	1.60	1.76	1.92	2.08	2.24	2.40	2.56	2.72	2.88	3.04	3.20
6	0.72	0.96	1.20	1.44	1.68	1.92	2.16	2.40	2.64	2.88	3.12	3.36	3.60	3.84	4.08	4.32	4.56	4.80
8	0.96	1.28	1.60	1.92	2.28	2.56	2.88	3.20	3.52	3.84	4.08	4.48	4.80	5.12	5.44	5.76	6.08	6.40
10	1.20	1.60	2.00	2.40	2.80	3.20	3.60	4.00	4.40	4.80	5.20	5.60	6.00	6.40	6.80	7.20	7.60	8.00
12	1.44	1.92	2.40	2.88	3.36	3.84	4.32	4.80	5.28	5.76	6.24	6.72	7.20	7.68	8.16	8.64	9.12	9.62
14	1.68	2.24	2.80	3.36	3.92	4.48	5.04	5.60	6.16	6.72	7.28	7.84	8.40	8.96	9.52	10.1	10.7	11.2
16	1.92	2.56	3.20	3.84	4.48	5.12	5.76	6.40	7.04	7.68	8.32	8.96	9.60	10.2	10.9	11.5	12.2	12.8
18	2.16	2.88	3.60	4.32	5.04	5.76	6.48	7.20	7.92	8.64	9.36	10.1	10.8	11.5	12.3	13.0	13.7	14.4
20	2.40	3.20	4.00	4.80	5.60	6.40	7.20	8.00	8.80	9.60	10.4	11.2	12.0	12.8	13.6	14.4	15.2	16.0
30	3.60	4.80	6.00	7.20	8.40	9.60	10.8	12.0	13.2	14.4	15.6	16.8	18.0	19.2	20.4	21.6	22.8	24.0
40	4.80	6.40	8.00	9.60	11.2	12.8	14.4	16.0	17.6	19.2	20.8	22.4	24.0	25.6	27.2	28.8	30.4	32.0
50	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0	24.0	26.0	28.0	30.0	32.0	34.0	36.0	38.0	40.0
60	7.20	9.60	12.0	14.4	16.8	19.2	21.6	24.0	26.4	28.8	31.2	33.6	36.0	38.4	40.8	43.2	45.6	48.0
70	8.40	11.2	14.0	16.8	19.6	22.4	25.2	28.0	30.8	33.6	36.4	39.2	42.0	44.8	47.6	50.4	53.2	56.0
80	9.60	12.8	16.0	19.2	22.4	25.6	28.8	32.0	35.4	38.4	40.8	44.8	48.0	51.2	54.4	57.6	60.8	64.0
90	10.8	14.4	18.0	21.6	25.4	28.0	32.4	36.0	39.6	43.2	46.8	50.4	54.0	57.6	61.2	64.8	68.4	72.0
100	12.0	16.0	20.0	24.0	28.0	32.0	36.0	40.0	44.0	48.0	52.0	56.0	60.0	64.0	68.0	72.0	76.0	80.0
110	13.2	17.6	22.0	26.4	30.8	35.4	39.6	44.0	48.4	52.8	57.2	61.6	66.0	70.4	74.8	79.2	83.6	88.0
120	14.4	19.2	24.0	28.8	33.6	38.4	43.2	48.0	52.8	57.6	62.4	67.2	72.0	76.8	81.6	86.4	91.2	96.0

210	220	230	240	250	260	270	280	290	300	310	320	330	340	350	W Ne
3.36	3.52	3.68	3.84	4.0	4.16	4.32	4.48	4.64	4.80	4.96	5.12	5.28	5.44	5.60	4
5.04	5.28	5.52	5.76	6.0	6.24	6.48	6.72	6.96	7.20	7.44	7.68	7.92	8.16	8.40	6
6.72	7.04	7.36	7.68	8.0	8.32	8.64	8.96	9.28	9.60	9.92	10.2	10.6	10.9	11.2	8
8.40	8.80	9.20	9.60	10.0	10.4	10.8	11.2	11.6	12.0	12.4	12.8	13.2	13.6	14.0	10
10.1	10.6	11.0	11.5	12.0	12.5	13.0	13.5	13.9	14.4	14.9	15.4	15.8	16.3	16.8	12
11.8	12.3	12.9	13.4	14.0	14.6	15.1	15.7	16.3	16.8	17.4	17.9	18.5	19.1	19.6	14
13.4	14.1	14.7	15.4	16.0	16.6	17.3	17.9	18.6	19.2	19.9	20.5	21.1	21.8	22.4	16
15.1	15.9	16.6	17.3	18.0	18.7	19.5	20.2	20.9	21.6	22.3	23.0	23.8	24.5	25.2	18
16.8	17.6	18.4	19.2	20.0	20.8	21.6	22.4	23.2	24.0	24.8	25.6	26.4	27.2	28.0	20
25.2	26.4	27.6	28.8	30.0	31.2	32.4	33.6	34.8	36.0	37.2	38.4	39.6	40.8	42.0	30
33.6	35.2	36.8	38.4	40.0	41.6	43.2	44.8	46.4	48.0	49.6	51.2	52.8	54.4	56.0	40
42.0	44.0	46.0	48.0	50.0	52.0	54.0	56.0	58.0	60.0	62.0	64.0	66.0	68.0	70.0	50
50.4	52.8	55.2	57.6	60.0	62.4	64.8	67.2	69.6	72.0	74.4	76.8	79.2	81.6	84.0	60
58.8	61.6	64.4	67.2	70.0	72.8	75.6	78.4	81.2	84.0	86.8	89.6	92.4	95.2	98.0	70
67.2	70.4	73.6	76.8	80.0	83.2	86.4	89.6	92.8	96.0	99.2	102	106	109	112	80
75.6	71.2	82.8	86.4	90.0	93.6	97.2	101	105	108	112	115	119	122	125	90
84.0	88.0	92.0	96.2	100	104	108	112	116	120	124	128	132	136	140	100
92.4	96.8	101	106	110	114	119	123	128	132	137	141	145	150	154	110
101	106	110	115	120	125	130	135	139	144	146	153	158	163	168	120

Remarks :

W : Weight of roving (gr/30 yds.)

Ne : Yarn count

HR : Hank roving

[1.2] Number of twists

The number of twists affects not only the yarn strength but also the spinning state, productivity and appearance of final products. Generally, the number of twists is expressed in the number of twists per unit length.

(1) $T.P.I = \alpha_e \sqrt{Ne}$

- T.P.I : Number of twists per inch
- α_e : Twist coefficient (British system)
- Ne : Cotton yarn number count (British system)

(2) $T.P.M = \alpha_m \sqrt{Nm}$

- T.P.M : Number of twists per meter
- α_m : Twist coefficient (Metric system)
- Nm : Yarn number count (Metric system)

(3) Twist coefficient table according to the spun yarn type

Application	Yarn number count (Ne)		Twist coefficient	
			α_e	α_m
Weaving yarn	Carded yarn	10	4.3 ~ 4.6	130 ~ 139
		20	4.1 ~ 4.2	124 ~ 127
		30	4.0 ~ 4.2	121 ~ 127
		40	3.9 ~ 4.2	118 ~ 127
	Combed yarn	30	3.8 ~ 4.0	115 ~ 121
		40	3.7 ~ 4.0	112 ~ 121
		60	3.6 ~ 3.9	109 ~ 118
		80	3.6 ~ 3.9	109 ~ 118
	Man-made fiber (65%)/Cotton (35%)	20	3.6 ~ 3.9	109 ~ 118
		30	3.6 ~ 3.9	109 ~ 118
		45	3.6 ~ 3.9	109 ~ 118
Knitting yarn	10 to 20% less than twist coefficients given for weaving yarn			

(4) Number of twists

Calculate the twist count by inputting the twist multiplier (TM). For adjustment of the twist count, input the twist count correction (Tf). See 7.1A “Operation Panel (Electronic Draft Specification)” for the input method.

$$\text{Actual twist count (T.P.I)} = \text{Desired twist count} \times \text{Twist count correction (Tf)} / 100$$

REFERENCE:

The twist count correction will be within the range from 103 to 105 based on experience.

The higher the spindle speed, the greater the twist loss.

NOTE: After setting the parameter, be sure to check actual spun yarn and make fine adjustment.

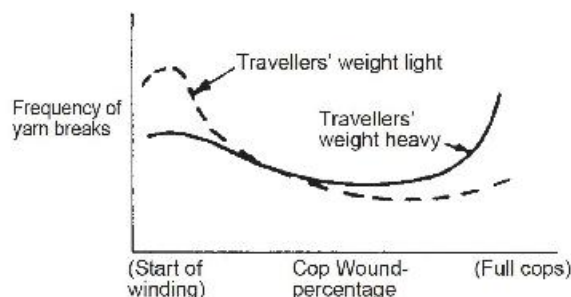
■ Reference data

Number of twists per 25.4 mm (TPI), calculated from yarn count and twist multiplier

Yarn count (Ne)	Square root of Ne.	Twist multiplier						
		3.00	3.25	3.50	3.75	4.00	4.50	5.00
1	1.00	3.00	3.25	3.50	3.75	4.00	4.50	5.00
2	1.414	4.24	4.60	4.95	5.30	5.66	6.36	7.07
3	1.732	5.20	5.63	6.06	6.50	6.93	7.79	8.66
4	2.00	6.00	6.50	7.00	7.50	8.00	9.00	10.0
5	2.236	6.71	7.27	7.83	8.39	8.94	10.1	11.2
6	2.449	7.35	7.96	8.57	9.19	9.80	11.1	12.2
7	2.645	7.94	8.60	9.26	9.92	10.6	11.9	13.2
8	2.828	8.49	9.19	9.90	10.6	11.3	12.7	14.1
9	3.00	9.00	9.75	10.5	11.2	12.0	13.5	15.0
10	3.162	9.49	10.3	11.1	11.9	12.6	14.2	15.8
11	3.316	9.95	10.8	11.6	12.4	13.3	14.9	16.6
12	3.464	10.4	11.3	12.1	13.0	13.9	15.6	17.3
13	3.605	10.8	11.7	12.6	13.5	14.4	16.2	18.0
14	3.741	11.2	12.2	13.1	14.0	15.0	16.8	18.7
15	3.872	11.6	12.6	13.6	14.5	15.5	17.4	19.4
16	4.0	12.0	13.0	14.0	15.0	16.0	18.0	20.0
17	4.123	12.4	13.4	14.4	15.5	16.5	18.5	20.6
18	4.242	12.7	13.8	14.8	15.9	17.0	19.1	21.2
19	4.358	13.1	14.2	15.3	16.3	17.4	19.6	21.8
20	4.472	13.4	14.5	15.7	16.8	17.9	20.1	22.4
21	4.582	13.7	14.9	16.0	17.2	18.3	20.6	22.9
22	4.69	14.1	15.2	16.4	17.6	18.8	21.1	23.5
23	4.795	14.4	15.6	16.8	18.0	19.2	21.6	24.0
24	4.898	14.7	15.9	17.1	18.4	19.6	22.0	24.5
25	5.0	15.0	16.2	17.5	18.7	20.0	22.5	25.5
26	5.099	15.3	16.6	17.8	19.1	20.4	22.9	25.5
27	5.196	15.6	16.9	18.2	19.5	20.8	23.4	26.6
28	5.291	15.9	17.2	18.5	19.8	21.2	23.8	26.5
29	5.385	16.2	17.5	18.8	20.3	21.5	24.2	26.9
30	5.477	16.4	17.8	19.2	20.5	21.9	24.6	27.4
31	5.567	16.7	18.1	19.5	20.9	22.3	25.1	27.8
32	5.656	17.0	18.4	19.8	21.2	22.6	25.5	28.3
33	5.744	17.2	18.7	20.1	21.5	23.0	25.8	28.7
34	5.830	17.5	19.0	20.4	21.9	23.3	26.2	29.2
35	5.916	17.7	19.2	20.7	22.2	23.7	26.6	29.2
36	6.0	18.0	19.5	21.0	22.5	24.0	27.0	30.0
37	6.082	18.2	19.8	21.3	22.8	24.3	27.4	30.4
38	6.164	18.5	20.0	21.6	23.1	24.7	27.7	30.8
39	6.245	18.7	20.3	21.9	23.4	25.0	28.1	31.2
40	6.324	19.0	20.6	22.1	23.7	25.3	28.5	31.6
41	6.403	19.2	20.8	22.4	24.0	25.6	28.8	32.0
42	6.48	19.4	21.8	22.7	24.3	25.9	29.2	32.4
43	6.557	19.7	21.3	23.0	24.6	26.2	29.5	32.8
44	6.633	19.9	21.6	23.2	24.9	26.5	29.8	33.2
45	6.708	20.1	21.8	23.5	25.2	26.8	30.2	33.5
46	6.782	20.3	22.0	23.7	25.4	27.1	30.5	33.9
47	6.855	20.6	22.3	24.0	25.7	27.4	30.9	34.3
48	6.928	20.8	22.5	24.2	26.0	27.7	31.2	34.6
49	7.0	21.0	22.7	24.5	26.2	28.0	31.5	35.0
50	7.071	21.2	23.0	24.7	26.5	28.3	31.8	35.4
60	7.745	23.2	25.2	27.1	29.0	31.0	34.9	38.7
70	8.366	25.1	27.2	29.3	31.4	33.5	37.6	41.8
80	8.944	26.8	29.1	31.3	33.5	35.8	40.2	44.7
90	9.486	28.5	30.8	33.2	35.6	37.9	42.7	47.4
100	10.0	30.0	32.5	35.0	37.5	40.0	45.0	50.0

[2] Choosing the Travellers

[2.1] Traveller number count



Yarn Breaks According to Cop Wound-percentage

The traveller number count should be determined in correlation with the occurrence of yarn breaks.

Generally, there is the correlation shown at left. Choose the traveller number count so that the variation of the frequency of yarn breaks will decrease at each of the cop wound-percentages. When choosing the traveller number count for completely new spinning conditions, use the nomograph given below as a guide.

[2.2] Approximation of traveller number count

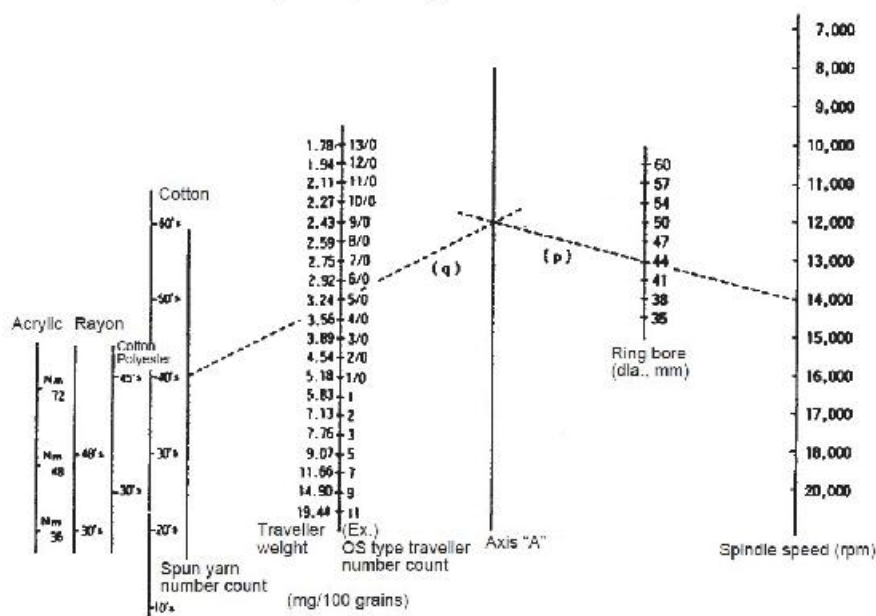
You can choose the proper traveller number count from the nomograph according to the yarn number count, ring bore and spindle speed.

(Example) Traveller number count to be used under the following conditions:

Cotton: 40 Ne, Ring bore: 44 mm, Spindle speed: 14,000 rpm

- (1) Draw straight line "p" passing through the spindle speed of 14,000 rpm and ring bore of 44 mm, up to axis "A."
- (2) Connect the intersection of line "p" and axis "A" with cotton yarn count 40 (Ne). (Line "q")
- (3) Read the traveller weight at the intersection of the line "q" and traveller weight axis. This is the proper traveller weight (5/0 for the OS type).

After choosing the traveller number count this way, make fine adjustment for determining the optimum traveller number count for your spinning environment.



[2.3] Recommended travellers for fibers

Fiber	Range of yarn number count	Recommended travellers
Cotton 100%	~ 10 ^S	TM BZ/hf
	10 ^S ~ 20 ^S	TM Z/hf, FC ZS/hf
	20 ^S ~ 40 ^S	NMG YS-2/hf-W, FC MS/hf
	40 ^S ~ 80 ^S	TM OSY/hf, FC ESY%ESY/hf
	80 ^S ~	TM OSY/hf, FC ESY&ESY/hf, TM OSS/hf, FC ESS&ESS/hf
Polyester/cotton	~ 20 ^S	TM Z/hf, TM BZ/hf
	20 ^S ~ 60 ^S	TM ZS/hf, NMG MS/hf
	60 ^S ~	TM ZS/hf, NMG MS/hf
Polyester/rayon	~ 30 ^S	TMOY/hf-N, NMG MS/hf
	30 ^S ~	NMG MS/hf
Polyester 100%	~ 20 ^S	TM Z/hf, TM BZ/hf
	20 ^S ~	NMG MS/hf
Rayon 100% (2" cut)	~ 30 ^S	HiNi O/hf, TM O/hf-N, NMG MS/hf
	30 ^S ~	HiNi OY/hf, NMG MS/hf
Acrylic 100% (2" cut)	~Nm36	HiNi OH, TM OH-Wz
	Nm36 ~	HiNi OYH, TM OYH-Wz

[2.4] Traveller types and manufacturers

	KANAI	R + F	BRACKER
C-shape	G MS/hf PK/hf BZ/hf	C2 f (r) C1 f (r) C2 rf C1 hr EMT (MT) C1 hd EMT (MT) C2 hr T C2 hr MTW	C2 f (r) C1 f (r) C2 fr M1 (EM1) dr M1 (EM1) udr M2 dr C2HW dr
Oval-shape	OSS OSS/hf OS OSY OSY/hf SUPER-OS YS-2 YS-2/hf O OY OH SUPER-O	EI1 f (r) EI1 hr EI1 f W/F EI2 f (r)	EM1 f (r) EI1 f (r) EH2 f EM2 f C1SM fr C1SH fr
Box-shape	ZS/hf ZSB/hf ZSB/hfw ZSC/hf Z/hf YZ/hf		C1UM udr C1UM udr C2UM dr

[2.5] Traveller weight comparison between manufacturers

Unit: mg (approximate)

No.	KANAI	R+F	BRACKER	No.	KANAI	R+F	BRACKER
27/0		5.6		1	62.0	60.0	63.0
26/0	7.8	6.0	7.1	2	74.0	71.0	71.0
25/0	8.6	6.3		3	81.0	80.0	80.0
24/0	9.2	7.1	8.0	4	88.0	85.0	90.0
23/0	10.0	7.5		5	95.0	95.0	95.0
22/0	11.0	8.0	9.0	6	110	105	100
21/0	11.5	8.5		7	120	110	110
20/0	12.0	9.0	10.0	8	135	125	125
19/0	13.0	10	11.0	9	155	140	140
18/0	13.5	11.2	12.5	10	175	160	160
17/0	14.0	12.8		11	200	180	180
16/0	15.0	13.2	14.0	12	220	200	200
15/0	16.5	14.5		13	245	225	225
14/0	18.0	16.0	16.0	14	265	235	250
13/0	20.0	17.0	17.0	15	285	250	265
12/0	21.5	18.0	18.0	16	300	265	280
11/0	23.0	19.0	20.0	17	315	280	300
10/0	25.0	20.0	22.4	18	325	300	315
9/0	27.0	22.5	23.5	19	340	315	335
8/0	28.5	23.5	25.0	20	355	325	355
7/0	30.0	26.5	28.0	21	365	335	
6/0	32.0	30.0	31.5	22	380	355	375
5/0	35.0	31.5	35.5	23	395	375	
4/0	38.0	35.5	40.0	24	410	385	400
3/0	42.0	40.0	45.0	25	420	400	
2/0	48.0	45.0	50.0	26	435	415	425
1/0	55.0	50.0	56.0	27	450	425	

[2.6] Traveller choosing criteria

The optimum traveller type differs depending upon the raw material, yarn number count, and delivery speed.

The table below lists the general traveller choosing criteria.

Fiber		Traveller type		Features
		KANAI	BRACKER	
Cotton	Low number count (Ne 20 or below)	BZ/hf O Z/hf	C2hrMT EI2fHw C2hrEMT	- Designed for very low number count Higher yarn quality and longer traveller life - Applicable under the wide range of conditions - Suitable in high-speed spinning within the range of Ne 10 to Ne 20
	Medium number count (Ne 20 to 50)	YS-2 OSY YS-2/hf OS	C1fT EI1fT C1hrT EI1fH	- Higher yarn quality and less yarn breaks - Stability within the range of Ne 40 to Ne 50 - Suitable in high-speed spinning within the range of Ne 20 to Ne 50 - Versatile
	High number count (Ne 50 or more)	YS-2 OSY OS OSS	C1fT EI1rT EI1rH EI1rHW	- Stability for Ne 80 or below - Stability for Ne 80 or below - Versatile - Usable for Ne 60 or more in combination with 2.5-mm flange rings
Cotton/synthetic fiber	Low and medium number counts	BZ/hf Super-O ZS/hf	C2hrMTW HEL2fW C1hrEMT	- Designed for very low number count Higher yarn quality and longer traveller life - Applicable under the wide range of conditions - Suitable in high-speed spinning within the range of Ne 10 to Ne 20
	High number count	ZS/hf MS/hf OS YS-2	C1hrEMT C1hrMT EI1rH C1fT	- Most popular Stability in high-speed spinning - Higher yarn quality Stability in high-speed spinning - Versatile - Stability for Ne 50 or more
Synthetic and man-made fibers	Short fiber (51 mm or below)	ZSC/hf OS MS/hf OH-Wz	EI1hrHW EI1fH C1hrMT —	- Higher yarn quality and longer traveller life - Versatile - Suitable for high-speed spinning - Superior in handling fibers of low melting point (Easy-to-run in)

7.1A Operation Panel (Electronic Draft Specification)

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[2.3] Uploading the saved data to the RX	7.1KE-120
[2.4] Changing the name of saved data	7.1KE-121
[2.5] Deleting the saved data	7.1KE-122
[2.6] Clearing the production past results to zero	7.1KE-123
[3] Changing Backlight Off Time	7.1KE-123
[4] Changing Date Display Format	7.1KE-123
7.1A.13 Screen Hierarchy List	7.1KE-124
7.1A.14 Setting Value List	7.1KE-128
[1] Spinning Conditions	7.1KE-128
[2] RX Operation	7.1KE-129
[3] User Settings	7.1KE-131
[4] Initial Settings and Adjustment	7.1KE-132
[5] Device Settings	7.1KE-133

7.1A.1 Overview

The RX has a control box at its OE.

On the control box is an operation panel which allows you to

- (1) setting the spinning yarn count and twist multiplier,
 - (2) change the spindle speed and
 - (3) modify the lifting operation
- ※Saving and modifying the settings using the USB memory

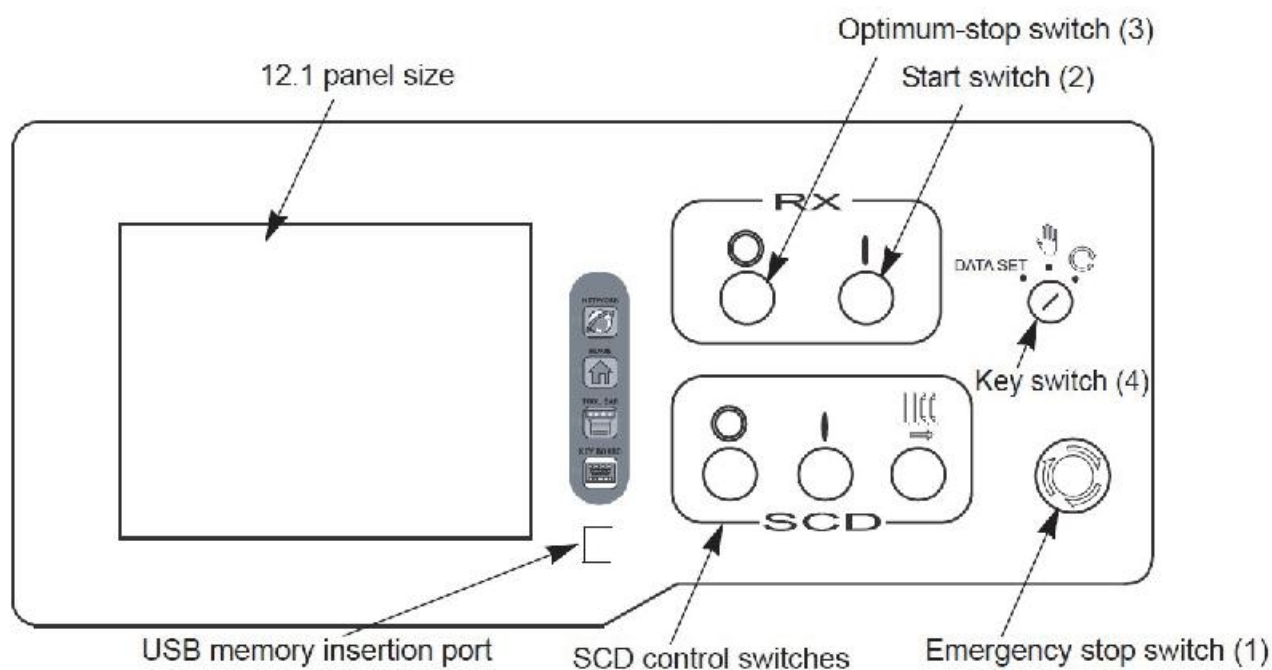
With the operation panel, you may monitor the following items when the RX is in operation:

- (1) Spindle speed (rpm)
- (2) Yarn length of full bobbin
- (3) Delivery speed
- (4) Number of twists per inch
- (5) Average spindle speed (rpm)
- (6) Time until bobbins become full
- (7) Weekly production by shift
- (8) Details of troubles occurred

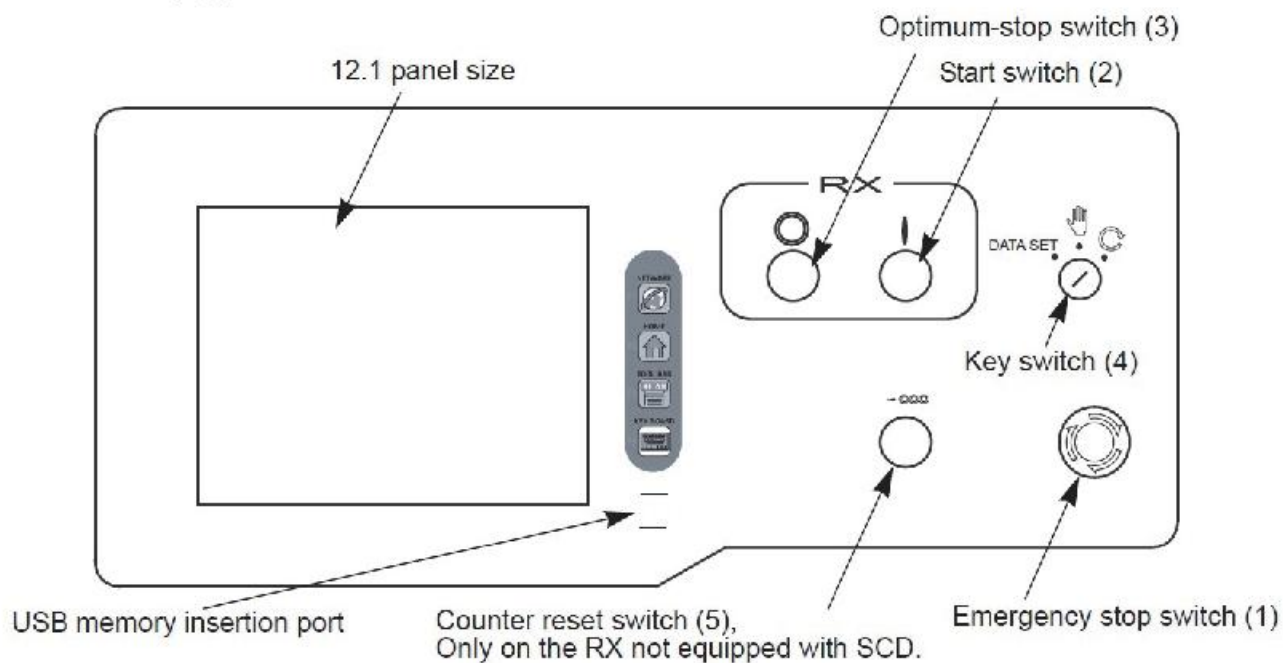
In addition, you may check the preset parameters during operation.

7.1A.2 Description of Operation Panel

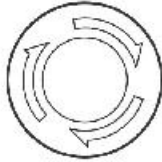
■ RX equipped with SCD



■ RX not equipped with SCD



[1] Major Switches



(1) Emergency stop switch (red)

To stop the RX in an emergency, press this switch. (This switch is provided on each of the GE and OE sides.)

1. Pressing this switch turns off the main motor so that the RX stops after rotation by inertia. This switch will be locked.
2. To release the lock, turn this switch clockwise.
3. All of the RX, SCD and trays will stop.



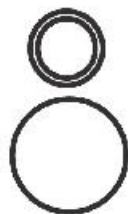
(2) Start switch (black)

To start the RX, press this switch. (This switch is provided on the OE.)

1. After doffing is completed and the RX is reset for full-bobbin, pressing this switch returns the lappets into the horizontal position, causes automatic heaving operation, and then starts spinning operation. Pressing this switch after an optimum-stop or emergency stop will restart the RX.

REFERENCE:

This switch cannot start the SCD if connected.



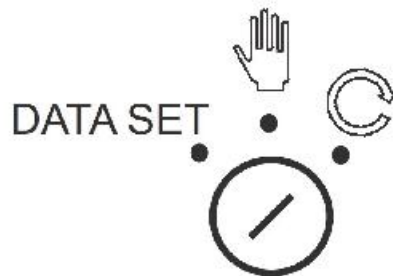
(3) Optimum-stop switch

To stop the RX in regular operation, press this switch. (This switch is provided on the OE.)

1. Pressing this switch stops the ring rail in the preset optimum position.

REFERENCE:

This switch cannot stop the SCD if connected.



(4) 3-position key switch

[Setting-enable position (DATA SET)]

- If this switch is set to the setting-enable position, you can set data or modify the preset data.

[Manual operation position (手)]

- If this switch is set to the manual operation position, you can drive the SCD (if connected) by manual operation.

[Automatic operation position (自)]

- If this switch is set to the automatic operation position, the automatic operation of the RX and SCD is possible. Only when set to the automatic operation position, the key of this switch can be fit in or pulled out.

(5) Counter reset switch (provided only for the RX not equipped with SCD)

To reset the production counter when the RX has come to a full-bobbin stop, press this switch.

NOTES:

- Holding down this switch for one second or more may reset the counter.
- This switch is enabled only when the RX has stopped because of a full-bobbin state. (If you want to reset the counter at an arbitrary time, use the Manual Switch screen. Refer to Subsection 7.1A.5 [1].)

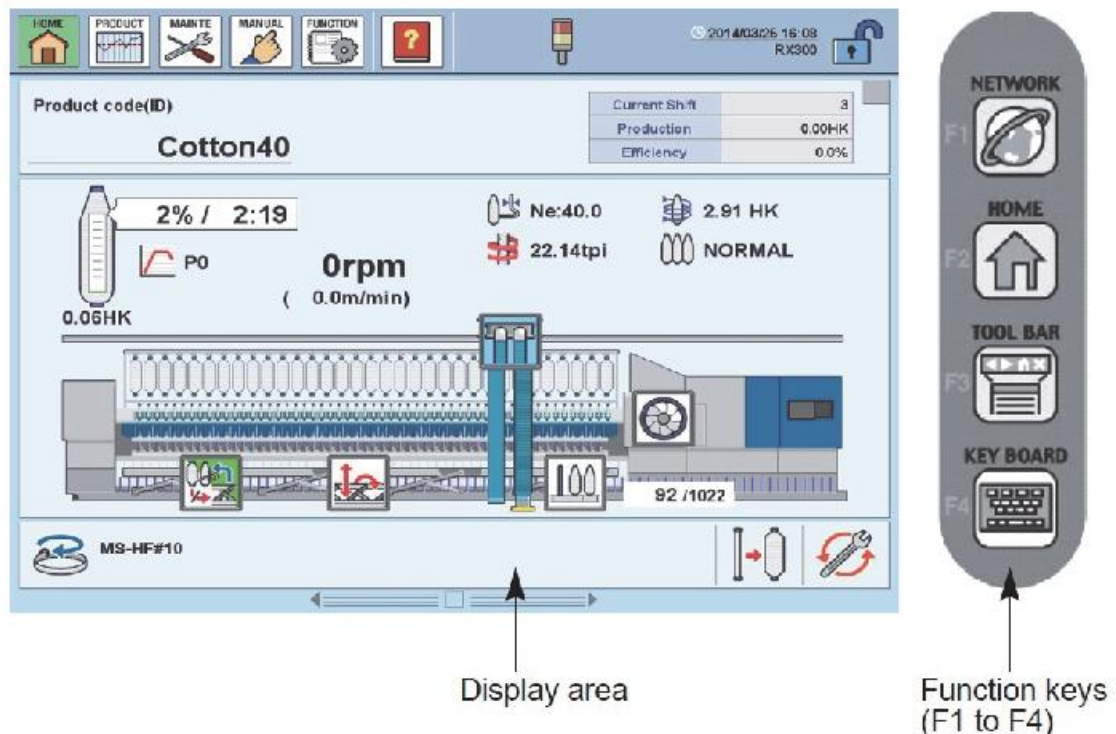
[2] Function Panel

Use this panel for monitoring of an operation state, setting of data, such as spinning conditions, and manual switch operations.

The display language can be selected among English, Chinese, Portuguese, Turkish, Spanish, Korean, and Japanese.

Basic key functions on the function panel are described below.

[2.1] Function keys (F1 to F4)



The function panel consists of the display area (color touch panel, 1,024 × 768 dots) and four function keys.

In actual operation, it is basically used for screen changeover by touching the display area and for setting change, but use the function keys (F1 to F4) for the following purposes:

- F1 (NETWORK) key
Displays the network screen for network settings such as frame IP address setting and referencing the panels of other frames.
※TMS specification only: Refer to the TMS instruction manual.
- F2 (HOME) key
Causes returning to the home screen (main screen upon power ON).
※Touch this key for returning from the network screen or when there is an abnormality with the screen display or operation.
- F3 (TOOL BAR)
Displays the tool bar (normally not displayed) on top of the screen.
- F4 (KEYBOARD)
Displays the keyboard.
※Use this keyboard for setting on the network screen.

[2.2] Screen configuration(Explanation on top menu)



The figure at left is an example of display screen. The display area is a touch-sheet switch.

Select the display mode by touching each of the five icons on the left-hand side in the top menu at the top of the screen.

The icon for the current display mode is indicated in green.

The sub-menu icons are displayed wholly on the screen or vertically at the left end of the screen. Touch the icon for the desired screen for screen selection.

The icon for the sub-menu selected at present is indicated in orange.

For a screen display language to be switched to another, touch the [FUNCTION] icon of the top menu and select a language on the maker setting screen ([MAKER] icon).

■ Explanation on top menu

HOME icon



Displays the main screen (Main mode).

See 7.1A.2 [2.6]

- Real-time display of the frame operation and production status
- Registration of start/stop of traveler change, roving change or maintenance operation
- Switching to traveler running-in operation

PRODUCT icon



- Report screen display (transition of production length and efficiency in the past one week)
- Total counter display
- Production history display for each spinning condition (past 30 records)
- Shift automatic changeover time setting
- Clock setting

See 7.1A.3 [2]

See 7.1A.3 [3]

See 7.1A.3 [5]

See 7.1A.3 [4]

See 7.1A.3 [6]

MAINTENANCE icon



Displays the RX operation status monitor (Maintenance mode).

- Display of rough measurement values such as each spindle rpm at present
- Graphic display of RX operation status in past 24 hours
- Trouble message history display (past 100 records)
- Input-output information display (IO monitor)
- Setting of warning display cycle for maintenance purpose

See 7.1A.4 [2]

See 7.1A.4 [3]

See 7.1A.4 [4]

See 7.1A.4 [5]

See 7.1A.4 [6]

MANUAL icon



Displays the manual operation (Manual mode).

- Half doffing operation
- Counter reset operation
- Doffer disabling setting
- SCD synchronize/non-synchronize setting
- Blow cleaner operation
- Manual ring rail/lappet operation
- SCD manual operation

See 7.1A.5 [1]

See 7.1A.5 [1]

See 7.1A.5 [1]

See 7.1A.5 [1]

See 7.1A.5 [2]

See 7.1A.5 [3]

See 7.1A.5 [4]

NOTE: For details on other operations, see 7.1.5.

FUNCTION icon



Displays the function menu screen (Function mode).

- Basic settings such as spinning condition and spindle pattern
- User setting such as frame name and display unit
- Detailed settings such as RX adjustments

See 7.1A.6, 7.1A.7

See 7.1A.8

See 7.1A.9

and device setting

- USB memory operation See 7.1A.10
- Display language switching (maker setting) See 7.1A.11

TROUBLE icon



No message
(not colored)



Message
existent
(blinking
in red)

Displays the trouble message screen.

See 7.1A.2 [2.3]

- Current trouble type display and resetting

NOTE: The icon blinks in red when there is a trouble message.

NOTE: The trouble display screen appears upon trouble occurrence with the display mode kept unchanged.

HELP icon



Displays the help screen.

- Program version display

- RX basic specifications display
- Typical trouble types display for reference
- RX adjustments display for reference

NOTE: The help screen appears with the display mode kept unchanged.



Upper row: Current time display

Lower row: RX name display



Locked



Unlocked key

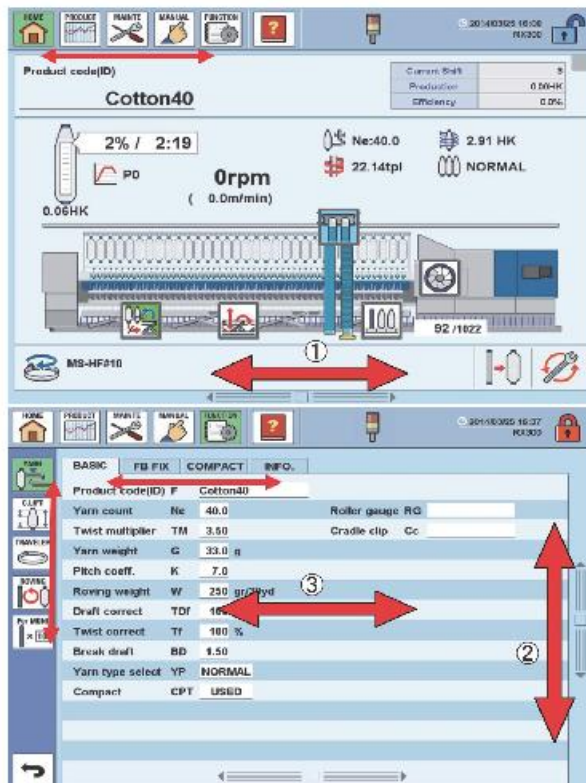
Displays the key switch status.

NOTE: Unlocked key appears when the key switch is set to its DATA-SET position.

[2.3] Basics of screen display switching

There are two methods to switch the screen display as shown below.

- (1) Switching the screen by touching the icons
The screen display is switched by touching the icon buttons on the top menu, function menu, and sub menu.
- (2) Switching the screen with the slide bar



- ① Switching of top menu screen
The top menu is switched with horizontal sliding operation of the slide bar in the lower part of the screen.
- ② Switching of sub menu screen
On a screen with a sub menu, the sub menu is switched with vertical sliding operation of the slide bar on the right side of the screen.
- ③ Switching of the tab page in screen
On a screen with multiple pages in it, such as a setting screen, the displayed page is switched with horizontal sliding operation of the central part of the screen.

※Sliding operation means

To move a finger touching the touch panel in horizontal or vertical direction

[2.4] Trouble message display and warningresetting

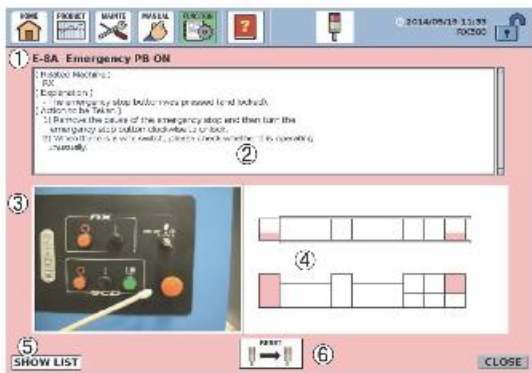


Fig. 1 Trouble message screen

- (1) Trouble message screen
- When a trouble occurs, the function panel is switched to the screen shown in Fig. 1.

Explanation on contents of screen display

- ① Trouble message (E- * * message)
- ② Trouble description (classification, description, and action)
- ③ Picture related to trouble detection
※No picture appears for some types of troubles.
- ④ Position related to trouble detection
※The related positions will blink in red.

RX top view



RX view from the function panel (RH) side





Fig. 2 Trouble list display screen

(2) Trouble list display

If multiple troubles occur, the [SHOW LIST] switch appears at the left bottom on the “Trouble Message” screen (Fig. 1). Touch this switch to display the “Trouble list display” screen.

REFERENCE:

Touch each error message on the list display screen to display the respective trouble message screen.

(3) Warning reset operation

On the RX, trouble reset operation is necessary to reset any trouble message. Touch the [RESET] icon  at the bottom of the screen.

(4) Close the trouble display screen.

The trouble display screen may be closed temporarily to see another screen for IO reference on the check screen, for example, if the trouble cannot be remedied soon. Touch the [CLOSE] switch at right bottom. For redisplay, touch the trouble display  icon on the top menu.

This icon blinks in red upon trouble occurrence to indicate existence of a trouble message.

[2.5] Basic setting operation(for spinning conditions)

The setting change procedure is explained here for an example of changing the yarn count in spinning conditions.

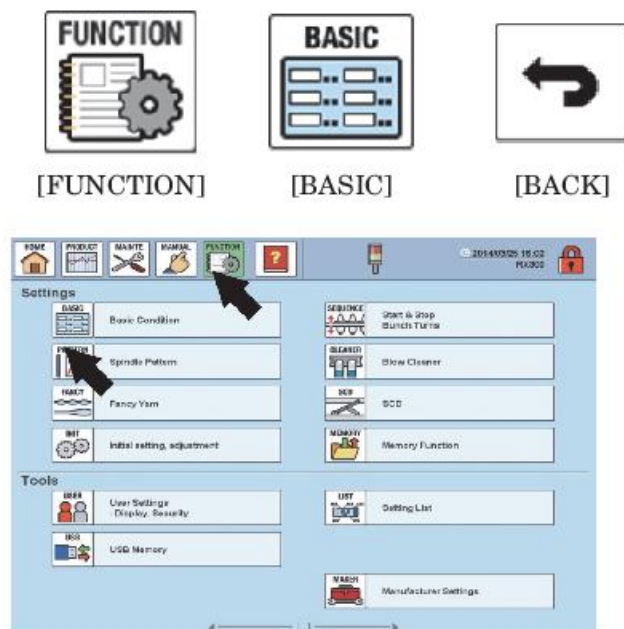


Fig. 3 Function menu screen



Fig. 4 Spinning condition setting screen

- (1) Touch the [FUNCTION] icon on the top menu to display the function menu screen.
- (2) Touch the [BASIC] icon here to display the "Spinning condition setting" screen (Fig.4).

REFERENCE:

- To set the chase length, traveler-related setting, or the like, touch the sub-menu (group of icons arranged vertically at the left end) to change over the screen display.
- On the screen with the sub-menu, the top icon is always in the selected status.
- On the screen with the sub-menu, touch the [BACK] icon to return to the preceding screen.
- To display another screen touch the respective icon on the top menu.

- (3) Make sure that the RX is stopped.

NOTE: Setting will fail if the emergency stop (E-8) status exists.

REFERENCE:

Some settings are possible during RX operation.

- (4) Set the key switch to the DATA-SET position.
(Condition required for setting change)



Fig. 5 Setting (Item selection)

- (5) Touch the box (white portion) of the setting item to be changed. The keyboard appears then.
- ※The color of the selected setting item box turns from white to yellow.

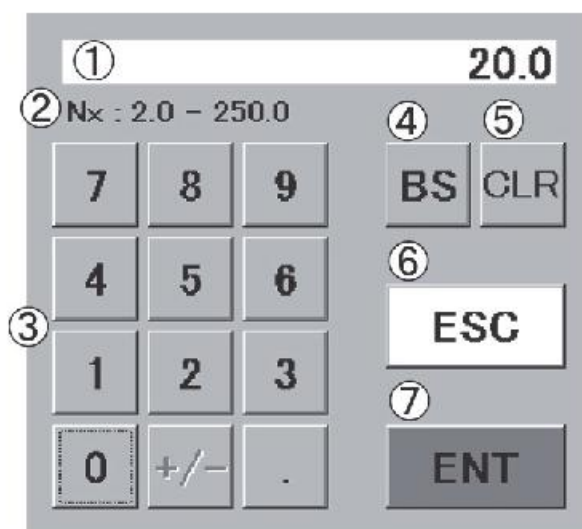


Fig. 6 Setting (Input)

- (6) Input the desired value for change from the keyboard (changing the yarn count from 40.0 to 20.0 in the example in Fig. 6). Touch [2], [0], [.] and [ENT] keys. Upon value input, the [CANCEL] and [SET] keys appear at right bottom on the screen.

REFERENCE:

Change the value similarly for changing any other setting item.

Keyboard explanation

- ① Input value display
- ② Setting range display
- ③ Keys (0 to 9, +/-, and .)
- ④ BS key (backspace during value input)
- ⑤ CLR key (clearing the input value)
- ⑥ ESC key (canceling selection) (keyboard close)
- ⑦ ENT key (input determination) (keyboard close)



Though the setting range is displayed above the keyboard, input outside the range causes the keyboard to be displayed as shown at left to disable the [ENT] key.



Fig. 7 Setting (Screen change during setting)



Fig. 8 Setting (before entry)

REFERENCE:

For changing another item, screen changeover within the sub-menu is possible, but bear in mind that screen changeover using the top menu is prohibited as a rule.

If the top menu is touched in the course of setting change, a screen appears to confirm if you desire to enter the data or to cancel it.

- (7) Touching the [SET] switch after checking no abnormal value input restarts processing.

NOTE: If protection by the password is set (by the user), the password input screen appears.

Input your password correctly (Only electronic drafts) .

A message "Processed normally" appears to complete the entry.

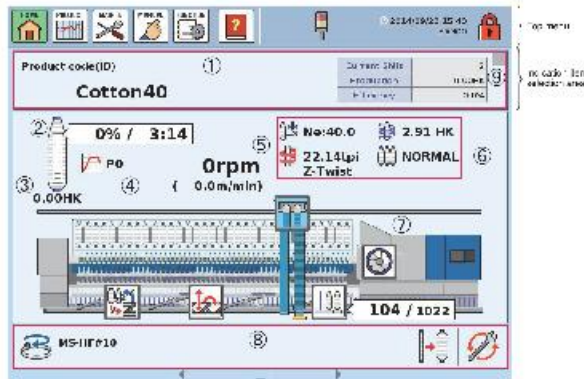
(Return the key switch to its previous position.)

The [CANCEL] and [SET] keys disappear from the screen.

If an error occurs, check the input and repeat setting.

NOTE: Touch the [CANCEL] key to invalidate the input.

[2.6] Explanation on main screen (HOME screen)

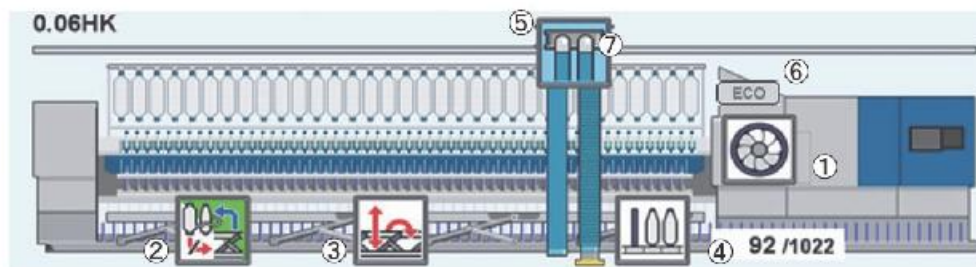


The home screen appears when the [HOME] icon on the top menu is touched.

The home screen displays the total information such as the RX operation status and the production information in real time.

- | | | |
|---|--------------------------------|--|
| ① | Indication item selection area | Displays the product code, shift production information, etc.
* Refer to indication item selection area in 7.1[2.9]. |
| ② | Current bobbin % (graph) | / Remaining time until full bobbin |
| ③ | Current production length | (The unit (m/HK) can be selected by user setting.) |
| ④ | Current pattern | <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Normal</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">During pattern program operation</div> </div> |
| ⑤ | Spindle rpm (Spinning speed) | Designated spindle rpm |
| ⑥ | Spinning condition | <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Set bobbin yarn count (The unit (Ne/Nm/Tex) can be selected by user setting.)</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Set twist multiplier (The unit (TPI/TPM) can be selected by user setting.)
S or Z twist appears on the frame for both S and Z twists.</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;">Full bobbin production length (The unit (m/HK) can be selected by user setting.)</div> </div> <div style="display: flex; align-items: center;">  <div style="margin-left: 10px;"> Style display
 NORMAL: Normal yarn
 COMPACT: Compact yarn
 SLUB: Slub yarn
 MULTI: Multi fancy yarn
 MULTI-S: Multi-slub fancy yarn </div> </div> |
| ⑦ | Machine status monitor | Indicates the machine operation status sensibly by the icon display color. |
| ⑧ | Operation warning display | Displays warning related to traveler change, roving change, or maintenance and operation registration. |

[2.7] Explanation on RX status monitor



Visually displays the current machine operation status by color.

Basically each color indicates the following: No color (white): Ordinary stop, Green: Running, Red (blinking):

Abnormal stop, Blue: Completion

Yellow/green blinking: Conditional waiting

① RX status



White : Ordinary stop
Green : Running
Yellow : Full bobbin stop
Red : Abnormal stop

② SCD synchronize/ non-synchronize (only when the SCD is provided)



White : Non-synchronize setting



Green(lower half) : Green: Semi-synchronize setting

NOTE: Processes from full bobbin stop to SCD automatic doffing are followed sequentially.

(Press the RX start switch to restart the RX.)



Green(upper half) : Semi-synchronize setting

NOTE: Processes from SCD automatic doffing to RX restart are followed sequentially.
(Press the SCD start switch to start SCD doffing after full bobbin stop.)



Green : All-synchronize setting

NOTE: Serial processes from full bobbin stop through SCD automatic doffing to RX restart are followed sequentially.

NOTE: Use the manual operation screen for selection between synchronization and non-synchronization.

③ Doffer status (only when the SCD is provided)



White : Ordinary stop

Green : Running

Yellow/green blinking : Conditional waiting (tray conveyance/retract for blow, etc.)

Yellow : Stop for check

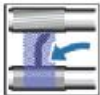
Red : Abnormal stop

(Interlocked)

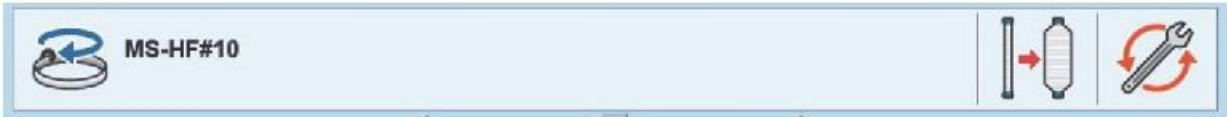


NOTE: Doffer operation prohibited status (doffer interlocked) is indicated as shown on the left.

NOTE: Use the manual operation screen for doffer interlocking.

- ④ Tray conveyance status
(only when the SCD is provided)
- 
- White : Ordinary stop
Green : Running
Yellow/green blinking : Conditional waiting (winder request, etc.)
Yellow : Separated stop (TBC Specification)
Blue : Conveyance completion
Red : Abnormal stop
NOTE: The figures on the right side indicate the current number of conveyed trays/specified number of trays.
- ⑤ Blow cleaner status
- 
- White : Ordinary stop
Green : Running
Yellow/green blinking : Running condition waiting?
Blue : Conveyance completion
Red : Abnormal stop
- ⑥ Suction operation status
(pneumatic inverter specification only)
- 
- Normal operation
- 
- Energy-saving operation
- ⑦ Compact device status
(Only when the compact device is provided)
- 
- White: Stop
Green: Running
Yellow/green blinking: Running condition waiting
Red: Abnormal stop

[2.8] Operation warning



The three icons at the bottom on the main screen visually show the warning and work related to traveler change, roving change and maintenance cycle visually. Basically, no color (white) indicates an ordinary status without warning, red (blinking) indicates warning, and brown indicates a work in progress.

NOTE: Each warning display should preparatorily be set to Warning = [Valid].

REFERENCE:

If this warning function is not to be used, these icons may be excluded from display by user setting.



No color: Normal status
(Upper row on the right: Traveler name)



Brown: Traveler change work
(Lower row on the right: Working time)



Yellow: Traveler running in
(Lower row on the right: Running-in doffing count/setting doffing count)



Fig. 9 Traveler change warning detail screen

(1) Traveler change warning

The set traveler name appears on the upper right side of the [TRAVELER] icon. When the traveler change work starts, the working time (minutes) appears on the lower right side of the icon.

Touch this icon to display the traveler change warning detail screen.

1. Explanation on display

- Change Date : Year/month/day of previous traveler change
- Traveller Type : Name of set traveler
- Running : Total running time after previous traveler change (hours)
- Running In : Running-in time after change (hours)
- Working Time : Traveler change working time (min)

NOTE: These data are validated when registration is performed without fail at the time of working.

2. Switch explanation

[Traveler Change] switch

- Touch this switch when starting the traveler change work.

[Running In] switch

- Touch this switch to run in the traveler upon completion of traveler change.

[Normal] switch

- Touch this switch to skip running in after traveler change.

REFERENCE:

The warning status is cleared upon touching the [Running In] or [Normal] switch after touching the [Traveler Change] switch.

[RECORD] switch

- Press this switch to display the traveler change history.

[BACK] switch

- Touch this switch to return to the main screen.



[TRAVELER]

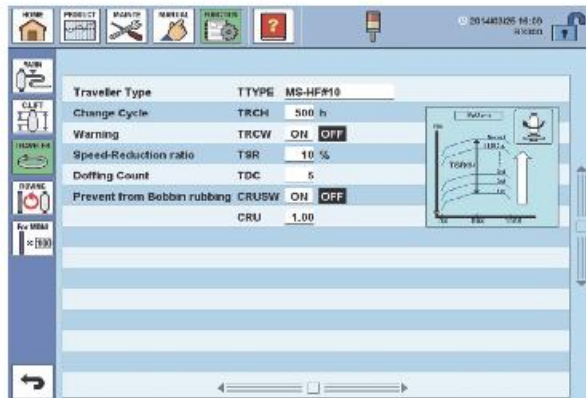
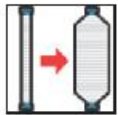


Fig. 10 Setting screen related to traveller



Red: Roving change warning

Red: Maintenance warning

Brown: Roving change in progress



Fig. 11 Traveler change warning detail screen

(2) Setting related to traveler

Touch the [FUNCTION] icon on the top menu. Then, on the sub-menu displayed by touching the [BASIC] icon for spinning conditions, touch the [TRAVELER] icon to display the setting screen related to the traveler. Refer to Subsection 7.1A.7 [5].

This screen is used for:

- Setting the name of traveler in use
- Setting the traveler change cycle and warning
- Setting related to traveler running-in operation

(3) Roving change warning

When roving change starts, the working time (minutes) is displayed on the lower right side of the icon.

Touch this icon to display the traveler change warning detail screen.

Register work [START] and work [FINISH] on this screen.

1. Explanation on display

- Change Time :
Month/day/hours/minutes of most recent roving change
- Running :
Total running time (minutes) after roving change
- Production :
Spinning length and doffing count
- Setting Doff. Count :
Doffing count set for warning
- Forecast for Consumption of Roving:
(The forecast for consumption of

roving is only for reference because it is calculated on assumption of 100% use of roving without considering shrinkage)

NOTE: This information is validated only when the registration is made without fail at the time of work.

2. Explanation on switches

[START] switch

- Touch this switch to start roving change.

[FINISH] switch

- Touch this switch when roving change is finished.

[RECORD] switch

- Touch this switch to display the roving change history.

[BACK] switch

- Touch this switch to return to the home screen.



[ROVING]



Fig. 12 Setting screen related to roving change warning

- (4) Setting related to roving change warning
Touch the [FUNCTION] icon on the top menu. Then on the sub-menu displayed by touching the [BASIC] icon for spinning conditions, touch the [ROVING] icon to display the setting screen related to roving change.

This screen is used for:

- Setting the name and length of roving in use
- Setting the roving change cycle and warning
- Setting automatic stop operation upon warning occurrence



No color: Normal status

Red: Maintenance warning

Brown: Maintenance work in progress

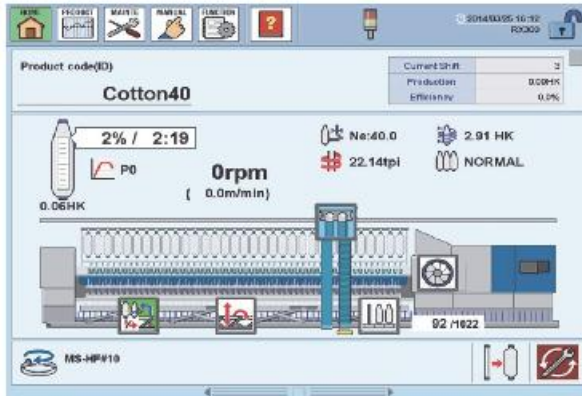


Fig. 13 Maintenance cycle warning detail screen

(5) Maintenance cycle warning

When a maintenance work starts, the working time (min) appears on the lower right side of the icon.

Touch this icon to display the maintenance cycle warning detail screen.

Register work [START] and [FINISH] on this screen.

1. Explanation on display

- Maintenance work name
- Date : year/month/day
- Passage of Time :

Total running time (hours) after previous work/Setting cycle (hours)

NOTE: This information is validated only when registration is made accurately at the time of work.

2. Explanation on switches

[START] switch

- Touch this switch when starting a maintenance work.

[FINISH] switch

- Touch this switch when finishing the maintenance work.

[BACK] switch

- Touch this switch to return to the home screen.

3. Warning items

- The two maintenance items below are automatically set in the program.
 - Gearing grease addition (every 1,000 hours)
 - Motor grease addition (every 3,000 hours)
- Warning items can be added on the maintenance warning setting screen.

[2.9] Display item customization

The display items in the customizable area of the main (home) screen can be customized.

Setting the data set key to DATA-SET position and touching the ■ button at the right upper on the indication area calls up the display item selection window (shown in Fig. 2) where you can select items to be displayed in the customizable area.

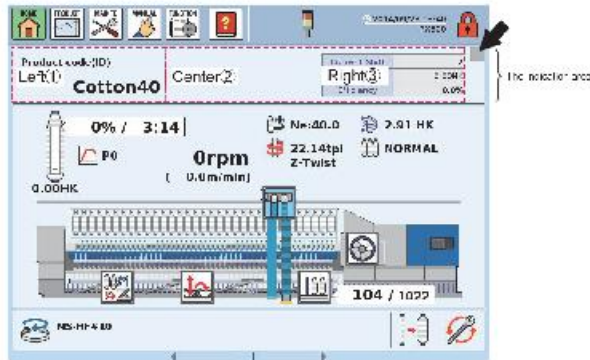


Fig. 14 Main (home) screen

※The display item customizable area consists of three sections--left, center and right as shown at the left. For each section, select items to be displayed.

On the display item selection window shown in Fig. 2, select check boxes of items to be displayed by touching them. After completion of selection, touch the SET button.

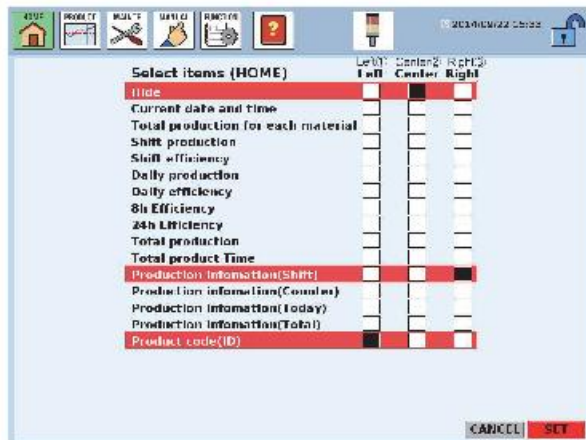


Fig. 15 Display item selection window

※Display items selectable

Hide (Non Display), which should be selected to display nothing in the customizable area.

- Current production percentage
- Current date
- Style total (Total production with new style)
- Shift production
- Shift efficiency (Operating rate for shifts)
- Today production
- Today efficiency (Today's operating rate)
- 8h Operating rate
- 24h Operating rate
- Total production
- Total production time
- Production info (Shift)--Current shift, current shift production and operating rate
- Production info (Today)--Production per day and operating rate
- Production info (Total)--Total production and total production time
- Product code (ID)

7.1A.3 Production Information Display (PRODUCT mode)

[1] Sub Menu Configuration



[PRODUCT]

Selecting the [PRODUCT] icon on the top menu displays the sub-menu on the left-hand side.



↑
Sub-menu



Touch this icon to refer to the production and running % by shift in the past one week.
(Report screen: See Subsection 7.1A.3 [2].)



Touch this icon to refer to the production and running % at the time of manual shift change.
(Counter screen: See Subsection 7.1A.3 [3].)



Touch this icon to refer to the production log information for each spinning condition.
(Production log screen: See Subsection 7.1A.3 [4].)



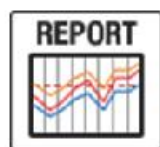
Touch this icon to set the weekly shift schedule.
(Shift schedule setting screen: See Subsection 7.1A.3 [5].)



Touch this icon to adjust the clock time of the machine.
(Time setting operation: See Subsection 7.1A.3 [6].)

[2] Report (REPORT)

[2.1] Report screen display



[REPORT]



Fig. 1 Report screen



Fig. 2 Report detail screen

Touch the [PRODUCT] icon on the top menu, and the [REPORT] icon on the sub-menu to display the report screen that displays the production information for the past one week.

- ① Y-axis of running % trend graph
 ※See Subsection 7.1A.3 [2] for display setting.
- ② Running % graph (broken line)
 Running % graph
 Target line (red dotted line)
 ※See Subsection 7.1A.3 [2.2] for display setting.
- ③ Shift production and running % display
 Displayed in red when the actual record is below the target.
 Touch each shift frame to display the detail screen.
- ④ Detail screen date change switches
 - [<<] : Detail information display for the day before.
 - [>>] : Detail information display for the next day.
- ⑤ Detail screen shift change switches
 - Shift [1] : Detail information is displayed for shift 1 of the day.
 - Shift [2] : Detail information is displayed for shift 2 of the day.
 - Shift [3] : Detail information is displayed for shift 3 of the day.
 - Shift [4] : Detail information is displayed for shift 4 of the day.
 - Shift [5] : Detail information is displayed for shift 5 of the day.
 - [1 DAY] : Detail daily information is displayed for the day.
- ⑥ Detail screen information change switch
 - [<<] : Displays the detail information for the preceding shift.

- [>>] : Displays the detail information for the next shift.

[2.2] Running % graph display changemethod

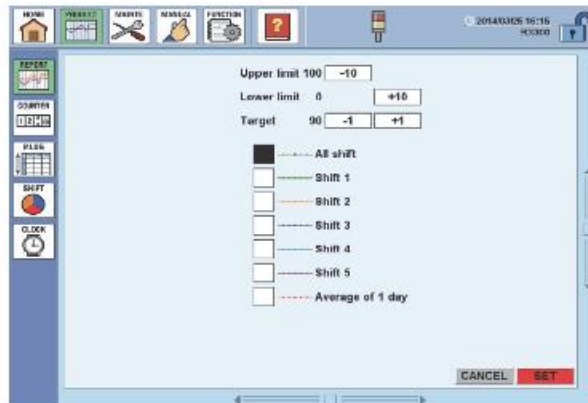


Fig. 3 Running % graph display change screen

Touch the Y-axis box ① of the report screen (Fig. 1) to display the running % graph display change screen.

The following items can be changed on this screen.

Upper and lower limits of running % graph display (0 to 100%: at intervals of 10%)

Target running % (70 to 100% at intervals of 1%)

Displayed graph contents

[All shift] : Graph connecting the running % of all shifts.

[Shift 1] : Graph connecting the running % of shift 1 only

[Shift 2] : Graph connecting the running % of shift 2 only

[Shift 3] : Graph connecting the running % of shift 3 only

[Shift 4] : Graph connecting the running % of shift 4 only

[Shift 5] : Graph connecting the running % of shift 5 only

[Average of 1 day] : Graph connecting the daily running %

REFERENCE:

These graphs may coexist.

NOTE: Before any of these changes, set the key switch to the DATA-SET position.

[3] Counter [COUNTER]



[COUNTER]

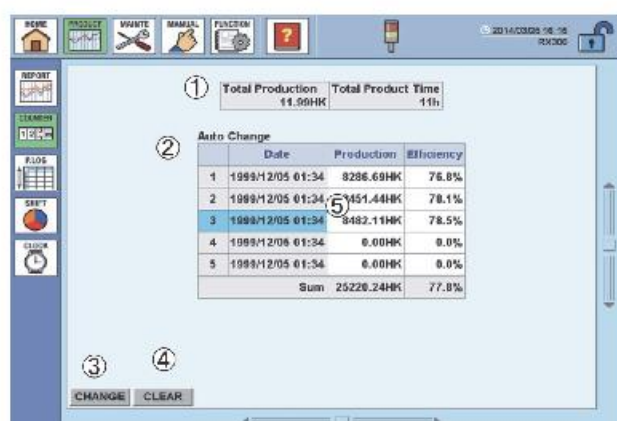


Fig. 4 Counter screen



Fig. 5 Shift counter detail screen

Touch the [PRODUCT] icon on the top menu and the [COUNTER] icon on the sub-menu to display the counter screen that displays the total production length spun by the RX.

Explanation on screen display contents

- ① Total production display (Total value of production length)
Total production time (Total value of ring frame running time)
- ② Display of total production length and running % by shift
Automatic change or manual change is displayed above the table. (See Subsection 7.1A.3 [5.4].).
The shift selected at present is displayed with dark blue background.
- Date : Date (year/month/day) when the counter restarts total counting after clearing.
- Production : Total spinning length (HK or M)
- Efficiency : Rate of ring frame running time (%)
- Sum : Display of the sum for shifts 1 through 5
- ③ Shift [CHANGE] switch
- ④ Shift counter [CLEAR] switch
- ⑤ Detail screen display switch
Touch the white margin portion of each shift counter to display the detail screen for the selected shift.
Touch [BACK] switch to return to the original screen.

[4] Production Log (P. LOG)

[4.1] Production log screen display



[P.LOG]

No.	Date	Style	Yarn count	Twist	Production
1	03-25 13:24	Cotton40	Nx30.0	32.14t/m	0.8kg
2	11-20 12:42	PV-R16	Nx20.0	15.82t/m	1310.1kg
3	11-20 12:10	PV-R16	Nx24.0	15.00t/m	6436.7kg
4	11-16 09:54	PV-R16	Nx18.0	13.72t/m	6175.8kg
5	11-09 11:46	PV-R16	Nx30.0	18.34t/m	6177.8kg
6	10-11 21:00	PV-R16	Nx30.0	18.34t/m	21645.4kg
7	08-09 08:26	PV-R16	Nx18.0	12.46t/m	21620.6kg
8	05-10 16:03	PV-T14	Nx20.0	14.66t/m	14100.7kg
9	04-29 10:28	PV-T10	Nx20.0	15.07t/m	28380.4kg
10	04-20 15:46	PV-T05	Nx30.0	14.49t/m	3617.5kg

Fig. 6 Production log screen

Touch the [PRODUCT] icon on the top menu and the [P. LOG] icon on the sub-menu to display the production log screen that displays past 30 production records.

When spinning starts after changing basic spinning conditions such as the yarn count and twist multipliers, the records are automatically updated as spinning starts.

Explanation on screen display contents

- Date : Spinning starting date (month-day hours:minutes)
- Style : Spinning style (setting)
- Yarn count : Set yarn count
- TM (Twist multiplier) : Set twist multiplier
- Production : Total production (kg)

NOTE: The values of the yarn count and twist multiplier input on the spinning condition setting screen are stored even for fancy yarn spinning.

NOTE: For the total production, the spinning length detected by rotation of the front roller is converted to the weight according to the average yarn count for calculation in consideration of the set number of spindles × production efficiency. Use it always as a reference value.

- The information for the current condition is displayed at the top (dark blue background) in the table, and the records get older as the No.increases.
- Since 10 records can be displayed in one screen, touch the tab page to display older records.

[4.2] Canceling any condition



Fig. 7 Deletion select screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the [DELETE] switch at the left bottom on the production log screen (Fig. 6) to display the deletion select screen.
- (3) On this screen, touch the frame of the data to be deleted and the display of selected frame is reversed to white on black. Touch the [SET] switch if it is acceptable.
- (4) Deletion is completed. (Deletion is possible only for one record at a time.)
- (5) Return the key switch to its previous position.

[4.3] Forced data update



Fig. 8 Renewal confirmation screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the [UPDATE] key at the left bottom on the production log screen (Fig. 6), and the update (renewal) check screen appears.
- (3) If update is acceptable, update the data forcibly and clear the current condition.
- (4) Update is completed.
- (5) Return the key switch to its previous position.

[5]
 Shift (SHIFT)

[5.1]
 Shift schedule setting screen display

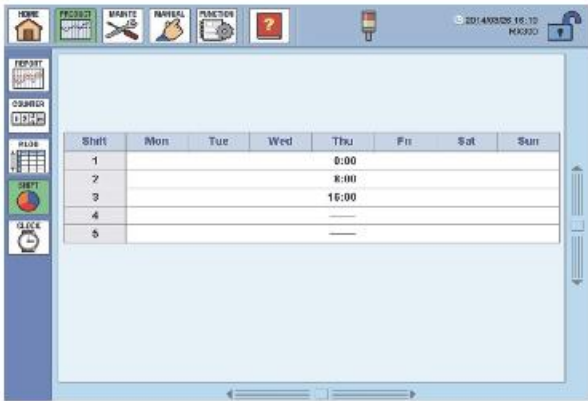


Fig. 9
 Shift schedule screen (Simple setting)

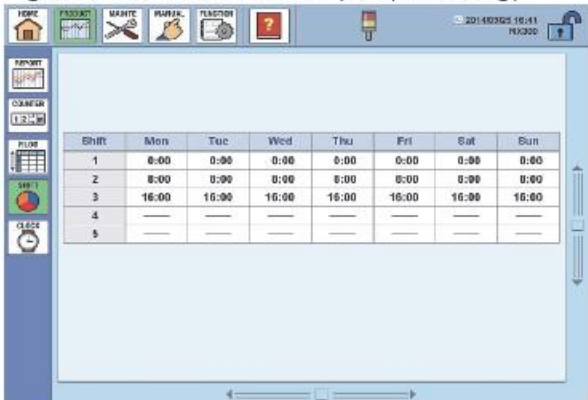


Fig. 10
 Shift schedule screen (Detailed setting)

Touch the [PRODUCT] icon on the top menu and the [SHIFT] icon on the sub-menu to display the shift schedule setting screen. The automatic shift change time is set on this screen. Shift change time setting can be set in two ways as follows:

- Simple setting : Shift change time is fixed every day.
- Detail setting : Number of shifts and change timings are as desired for each day of the week. The number of shifts can be set up to 5. Shift 1 is for each day of the week.

[5.2] Shift schedule setting (Simple setting)

This is the method for setting same shift change for every day.



Fig. 11 Simple setting screen

- (1) Set the key switch to the DATA-SET position,
- (2) Touch the frame (white portion) indicating the time on the shift schedule screen (Fig. 9 or Fig. 10) to display the setting screen.
The simple setting screen (Fig. 11) appears when simple setting is adopted at present, and detailed setting screen (Fig. 12) appears when detailed setting is adopted at present.

- (3) For simple setting, touch the [SIMPLE] switch.
(The switch frame color changes to black).
- (4) Set the number of shifts.
Touch the frame (white portion) indicating the time for each shift to display the keyboard.
- (5) Then set the shift change time.
Touch the frame (white portion) indicating each shift time, and the keyboard appears.

EXAMPLE: To set 8:30:

Touch the [8], [:], [3], [0] and [ENT] keys.

REFERENCE:

If the input value is abnormal, the time display color turns red. Correct the value by referring to the overall time relationships.

(Actually, accurate decision on the abnormal input portion is difficult.)

If the number of shifts is increased, 99:99 (red) appears as the initial. Set the time again.

- (6) After the end of all inputs, touch the [SET] switch to complete setting.
- (7) Return the key switch to the original position.

[5.3] Shift schedule setting (Detailed setting)

This setting method is for the case when the shift change is different from day to day.



Fig. 12 Detailed setting screen



Fig. 13 Detailed setting screen (During setting)

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the frame (white portion) indicating the time on the shift schedule screen (Fig. 9 or 10) to display the setting screen.
The simple setting screen (Fig. 11) appears for simple setting, and detailed setting screen (Fig. 12) for detailed setting.
- (3) Touch [DETAIL] for detailed setting. (The frame becomes black.)

- (4) Set the number of shifts for each day of the week.
Touch the frame (white portion) indicating the number of shifts for each day of the week, and the keyboard appears. (Setting of 1 to 5)

REFERENCE:

The number of shifts may be varies for each day of the week.

- (5) day of the week.
Touch the frame (white portion) indicating each shift change time to display the keyboard.

EXAMPLE: To set 8:30:

Touch the [8], [:], [3], [0] and [ENT] keys.

REFERENCE:

If the input value is abnormal, the time display color turns red. Correct the value by referring to the overall time relationships.

(Actually, accurate decision of the abnormal input portion is difficult.)

When the number of shifts is increased, 99:99 (red) appears as the initial. Set the time again.

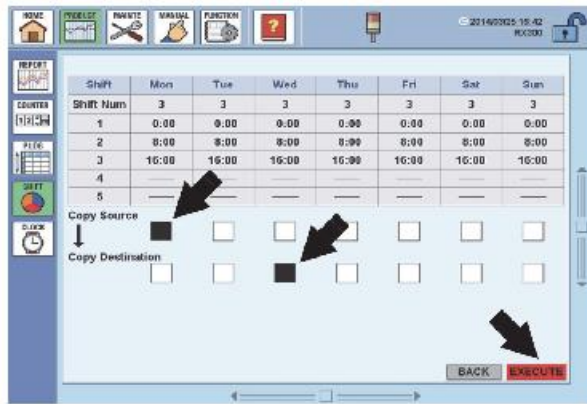


Fig. 14 Detailed setting copy screen

REFERENCE:

The copy function is available to adopt the same setting for Monday through Thursday, for example. Touch the [COPY] switch at the bottom left on the detailed setting screen (Fig. 12) to display the detailed setting copy screen. Then select the copy source and destination days of the week (to change their boxes from white to black), and touch the [EXECUTE] switch to complete copying.

(Fig. 14 shows the case for copying the setting from Monday to Wednesday.)

- (6) After the end of all inputs, touch the [SET] switch to complete setting.
- (7) Return the key switch to its previous position.

[5.4] Method for summation by shift(Shift change method)

(1) Setting of summation method is possible in two ways as follows:

[Automatic shift change]

- This is for summation by automatically changing the total shift counter corresponding to the shift change set in Subsection 7.1A.3 [5] “Shift (SHIFT)”.

[Manual shift change (up to 5 shifts)]

- This is for summation by manually changing the shift by the operator.

(2) For manual shift change, touch the [CHANGE] switch on the counter screen to display the shift change screen (Fig. 16).

Select the new shift to be started ([Shift 1], [Shift 2], [Shift 3], [Shift 4] or [Shift 5]) here and touch the [SET] key to complete the shift change.

For summation by automatic shift change, select the [Auto] switch.



Fig. 15 Counter screen

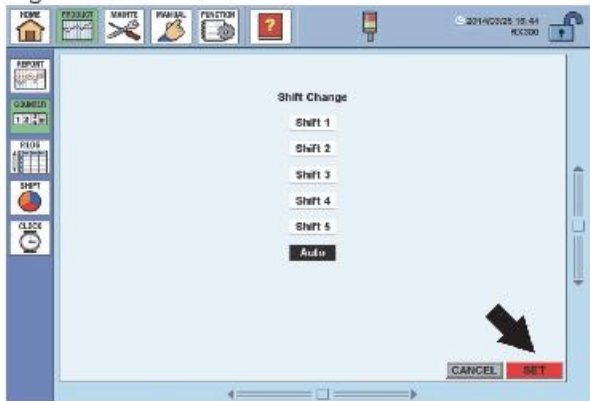


Fig. 16 Shift change screen

[5.5] Shift counter clearing method



Fig. 17 Counter screen

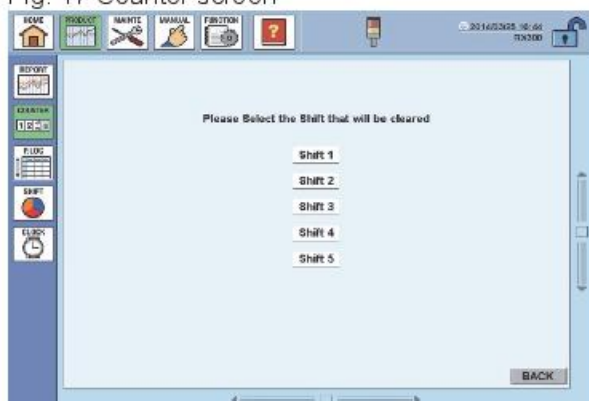


Fig. 18 Shift counter clear selection screen



Fig. 19 Shift counter clear confirmation screen

- (1) Touch the [CLEAR] switch on the counter screen to display the shift counter clear selection screen (Fig. 18).

Select here the desired shift ([Shift 1], [Shift 2], [Shift 3], [Shift 4] or [Shift 5]) for clearing its counter clear.

- (2) Then the shift counter clear confirmation screen appears. Check if the shift desired for clearing the counter is selected, and touch the [SET] switch. (To cancel the selection, touch the [CANCEL] switch.)
- (3) Shift counter clearing is completed.

REFERENCE:

For shift counter clearing, touch the [FUNCTION] icon  on the top menu, touch the [USER] icon  for user setting, and touch the [PROTECT] icon  on the sub menu. On the screen that appears then, it is possible to set whether key condition is necessary or not. If the key condition is set as necessary, the key switch must be set to the DATA-SET position.

[6] Clock (CLOCK)

Touch the [CLOCK] icon on the sub-menu displayed by touching the [PRODUCT] icon on the top menu to display the clock setting screen.

Adjust the clock data on this screen.



[CLOCK]



Fig. 20 Clock setting screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the box for the item to be changed (year, month, day, hours, or minutes) and the keyboard appears.
- (3) Input the desired value for correction and touch the [SET] switch displayed at the right bottom.
- (4) Return the key switch to its previous position to complete clock adjustment.

REFERENCE:

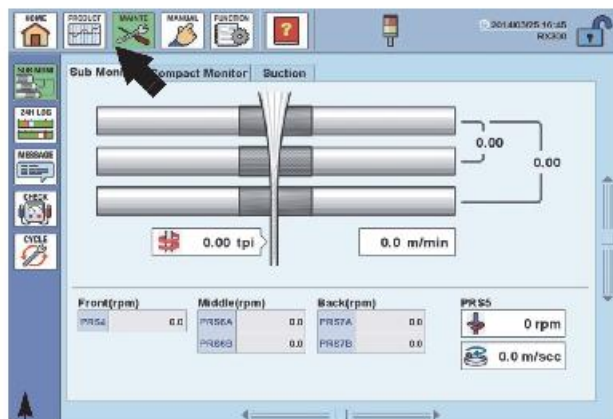
Date display can be changed by user setting (refer to 7.1A.9 [2]).

7.1A.4 Explanation on Maintenance Information Screen(MAINT Mode)

[1] Sub Menu Configuration



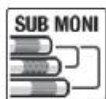
[MAINT]



Sub menu

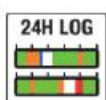
Touch the [MAINT] icon on the top menu, and the sub menu appears on the left side.

Fig.1 Maintenance information screen (Sub monitor screen)



Touch this to refer to the measured value of each spindle or draft shaft, or the calculated value of twist multiplier or draft.

(Sub Monitor screen: See Subsection 7.1A.4 [2].)



Touch this to refer to the RX operation log for the past 24 hours.

(24H log screen: See Subsection 7.1A.4 [3].)



Touch this to refer to the past trouble occurrence status.

(Message history screen: See Subsection 7.1A.4 [4].)



Touch this to refer to the IO monitor.

(Check screen: See Subsection 7.1A.4 [5].)



Touch this to set maintenance items for warning display on the HOME screen.

(Maintenance cycle setting screen: See Subsection 7.1A.4 [6].)

First, the sub monitor screen appears. Touch each icon on the sub menu corresponding to the desired screen.

NOTE: The selected icon turns orange. For returning to the home screen, touch the [HOME] icon on the top menu.

[2] Sub Monitor (SUB MONI)

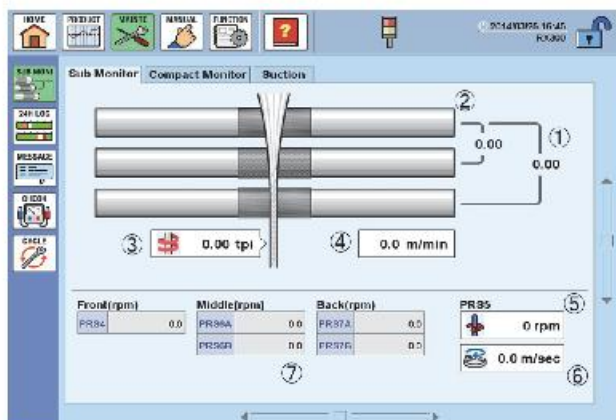


Fig. 2 Sub monitor screen

Pages of sub monitor

- [Sub Monitor] : Measures the main rpm of the machine drive shaft and displays the calculated value.
- [Compact Monitor] : Performs monitor display related to the compact device.
RX with the compact device only (Refer to the Instruction Manual of the compact spinning set.)
- [Suction] : Performs monitor display related to the pneumatic inverter device.
RX with the pneumatic inverter device only (Refer to the Instruction Manual of the pneumatic inverter device.)
- [Tray] : Performs monitor display related to the tray conveyance. (RX with SCD only) (Refer to the Instruction Manual of the SCD type simultaneous doffing.)

Explanation on [Sub Monitor] screen display contents

The [Sub Monitor] screen displays the real-time rpm, etc. of the machine drive main shaft measured in the current operation.

- ① Total draft (based on detection by PRS4 and PRS7A)
- ② Break draft (based on detection by PRS6A and PRS7A)
- ③ Twist multiplier (based on detection by PRS4 and PRS5)
- ④ Spinning speed (based on detection by PRS4)
- ⑤ Spindle rpm (based on detection by PRS5)
- ⑥ Traveler estimated speed (approximate value calculated from the spindle rpm of ⑤)
- ⑦ Draft shaft rpm

The number of sensors varies with the machine specification.

Front roller rpm (PRS4)

Middle roller rpm (PRS6*)

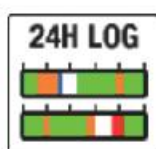
Back roller rpm (PRS7*)

NOTE: Each shaft rpm involves fluctuation because of short measurement cycle.

Please refer to it as rough estimation of the operating status.

The draft and twist multiplier will not be displayed for some time after startup.

[3] 24H LOG



[24H LOG]

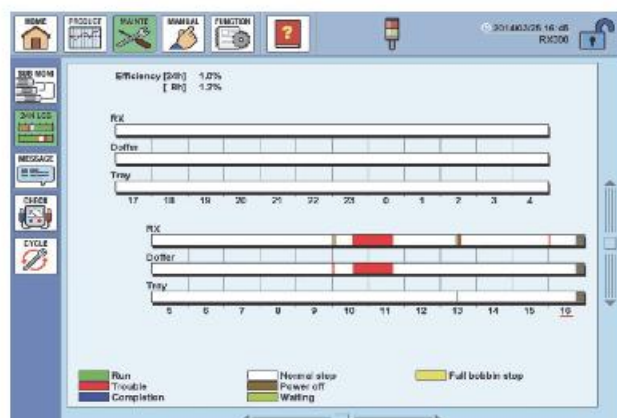


Fig. 3 24H log screen

Touch the [MAINT] icon on the top menu, and the [24H LOG] icon on the sub menu to display the 24H LOG screen.

This screen graphically displays the frame operation status for the past 24 hours.

For the displayed contents, see the display color explanation at the bottom on the screen.

The displayed information can be used to supplement the RX operation/stop information.

- Isn't abnormal stop or careless stop left uncorrected?
- Isn't tray conveyance taking too much time?
- Isn't any doffing failure left uncorrected?

[4] Message Log (MESSAGE)

Touch the [MAINT] icon on the top menu, and the [MESSAGE] icon on the Sub menu to display the message log screen. This screen allows reference to the past trouble messages and operation details.



[MESSAGE]

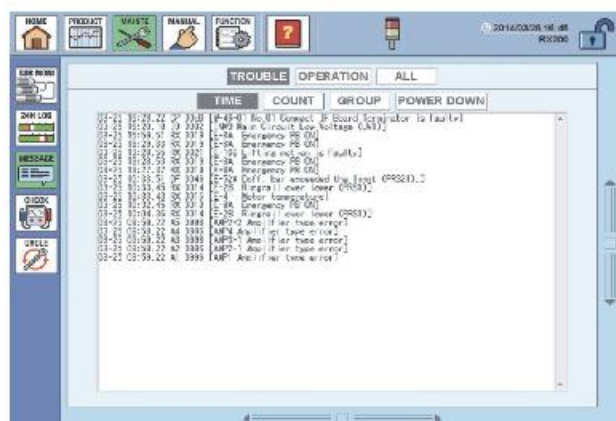


Fig. 4 Trouble log screen

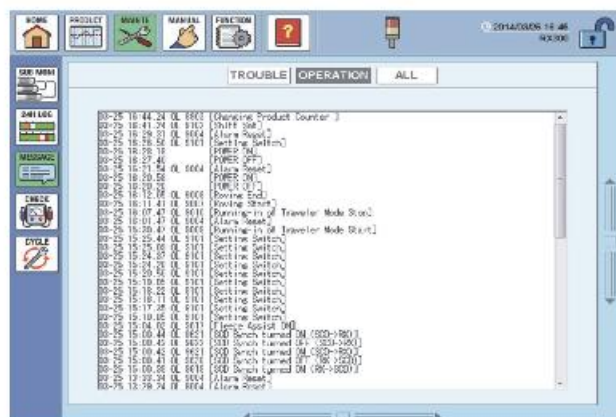


Fig. 5 Operation log screen

(1) Display of trouble log

Up to 100 past troubles are displayed.

Touch the [TROUBLE] switch to display the trouble log screen.

You can select one of the three display methods shown below.

- [TIME] : Display in the reverse order of occurrence
- [COUNT] (frequency) :
Display in the descending order of frequency
- [GROUP] : Display of occurrence rate by group

Each trouble is displayed in terms of “occurrence date and time, classification, code, and message”.

(2) Operation log

Up to 300 past operation records are displayed.

Touch the [OPERATION] switch to display the operation log screen.

Each operation record is displayed in the order of “Occurrence date and time, classification, code, and description”.

(3) Display of all logs

Touch the [ALL] switch to display the all log screen.

(4) Touch the [POWER DOWN] switch to display the main inverter voltage change in graph upon occurrence of the latest power interruption.

[5] Check (CHECK)

Touch the [MAINT] icon on the top menu, and the [CHECK] icon on the sub menu to display the check screen. This screen allows reference to the drive system operation information and IO monitor. It can be used for checking the cause of a machine trouble.



[CHECK]



Fig. 6 RX drive system information

(1) Display of RX drive system information

Touch this icon  in the upper part on the screen.

This screen displays the target rpm for each spindle, draft and lift, and the basic information for each servo amplifier and inverter.

7.1A.4 Explanation on Maintenance Information Screen(MAINT Mode)

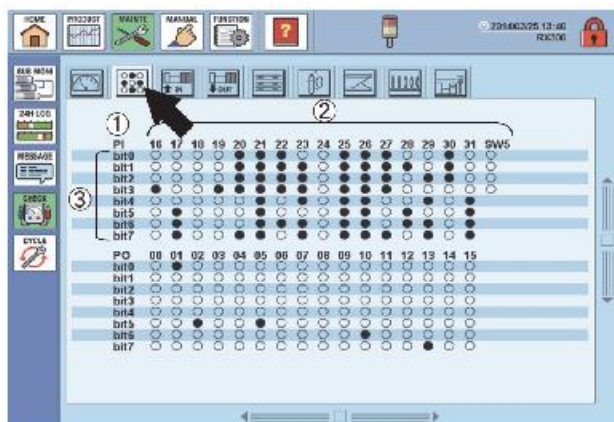


Fig. 7 IO monitor (Matrix)

(2) IO monitor (matrix)

Touch the  icon in the upper part on the screen.

This screen allows checking the statuses of all inputs and outputs at a glance.

Explanation on the screen display contents

○ : OFF

● : ON

Inputs : PI16 to PI31(bit0 to bit7), DIP SW5 of the CPU board

Outputs : PO00 to PO15 (bits 0 to 7).

See the electrical system drawing for the roles of these inputs and outputs.

EXAMPLE: In the case of RX start SW
RX START (PI17P1)

This means P1 (bit1) of PI17
(input).

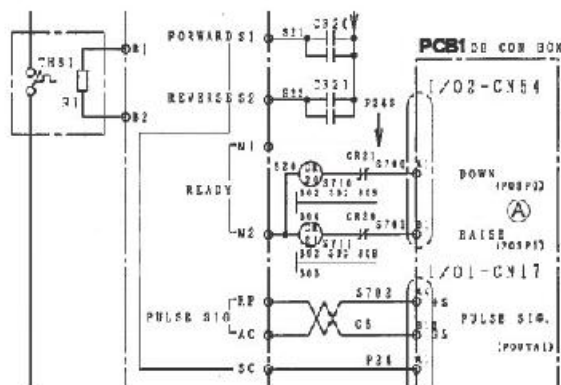


Fig. 8 Circuit diagram

EXAMPLE: In the case of (A) in the figure at left

(PO 9 P0)

① ② ③

bit0 to 7
0 to 31

PI: input
PO: output

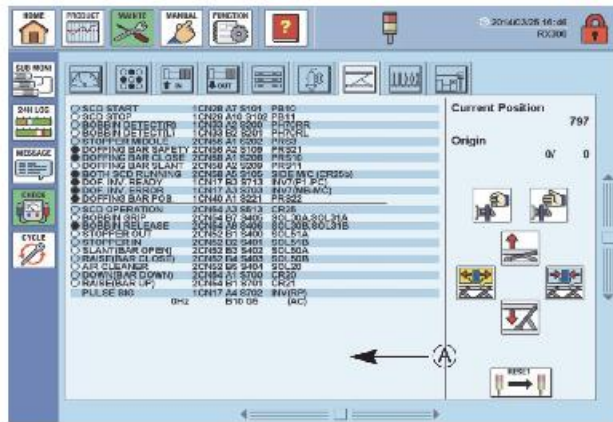


Fig. 9 IO monitor (Each device)

(3) IO Monitor (by Device)

Standard inputs and outputs are grouped for each device. The names and corresponding electric parts are displayed. The following icons are used for categorizing devices:



Main RX (including spindle drive)



Draft drive group



Lappet and ring rail drive group



Doffer group



Tray conveyor group



Blow cleaner group

Since manual operations corresponding to each device are arranged on each screen, changes in IO status upon each operation can be checked at the same time.

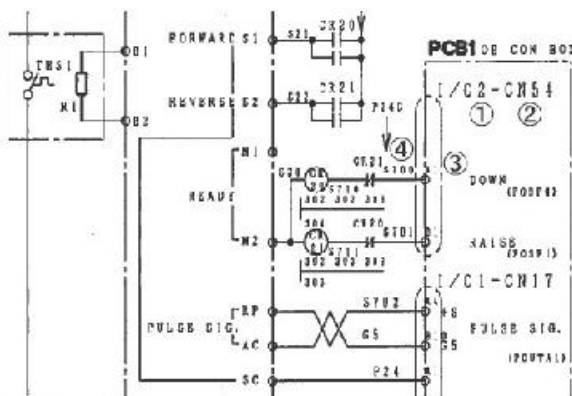
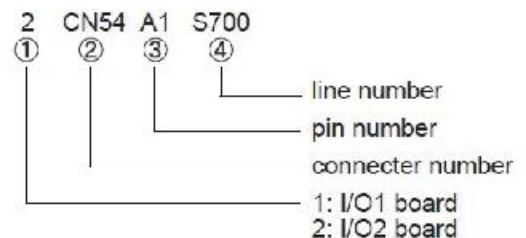


Fig. 10 Circuit diagram

EXAMPLE: In the case of ④ in Fig. 9



7.1A.4 Explanation on Maintenance Information Screen(MAINT Mode)

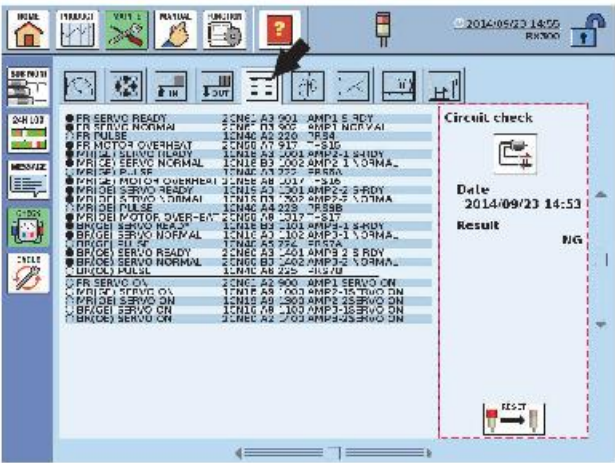


Fig. 11 IO monitor (Draft drive group)

(4) Inverter and servo amplifier command circuit check

For the main motor, draft drive, and others, it is checked if the rotation command for each motor is being executed properly. While the lappet is reversed, touch the [Check command circuit] icon in the right side on the screen of the draft drive group to start checking.



[Check command circuit] icon



Green: Checking

The icon is green-colored while the check is being executed. When the check is finished (for approx. 30 seconds), the execution date and result (OK/NG) is displayed. If the result is NG, take an action referring to the error message displayed simultaneously.

※It is normally executed for every full bobbin stop. (When "Command circuit check function" is set to [Valid] on the setting screen of "Initial setting, adjustment" – "Others")

[6] Cycle (CYCLE)



[CYCLE]

Fig. 12 Set name screen

Fig. 13 Set cycle screen

- (1) Display the maintenance warning setting screen.

Touch the [MAINT] icon on the top menu, and the [CYCLE] icon on the sub menu to display the maintenance warning setting screen. On this screen, set the name and warning cycle for cyclic warning display on the HOOME screen (see Subsection 7.1A.2 [2.8].)

- (2) Setting method

1. Set the key to the DATA-SET position.
2. Touch the [NAME] switch in the upper part on the screen to display the set name screen.
3. Touch the desired box for registration to display the keyboard.
4. Input the name.
5. Then touch the [CYCLE] switch in the upper part on the screen to display the set cycle screen.
6. Touch the setting box of the same maintenance number as the name input. The keyboard appears. Set the maintenance cycle.
7. Finally touch the [SET] switch in the lower right portion on the screen to enter the input data. Return the key to its previous position to complete setting.

REFERENCE:

If any character is included in the maintenance name, cycle warning occurs on the home screen. To cancel cycle warning, delete the maintenance name.

7.1A.5 Explanation on Manual OperationScreen (MANUAL Mode)

[1] Manual Operation Menu Screen



[MANUAL]

Touch the [MANUAL] icon on the top menu to display the Manual Operation Menu screen.

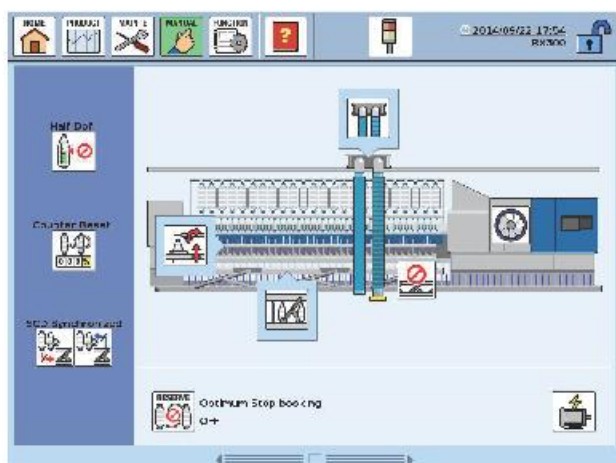


Fig. 1 Manual operation menu screen

■ Explanation on icons

(1) [Half Doff] icon



Touch this icon and select [YES] on the confirmation screen for half doffing operation.

(2) [Counter Reset] icon



Touch this icon and select [YES] on the confirmation screen for counter resetting operation.

(3) [Doffer Lock] icon (on RX with SCD only)



Touch this icon while the doffer is in the storage position to lock the doffer operation.

(White: Doffer enabled, Yellow: Doffer locked)

(4) [SCD Synchronized] icon (on machine with SCD only)



Touch this icon to enable/disable synchronized operation between the SCD and RX.

(White: Not synchronized)



*It is set whether synchronized operation is enabled/disabled from the RX to the SCD or from the SCD to the RX.

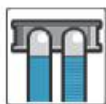
(Green: Synchronized)

- (5) [Suction] icon



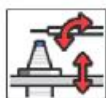
Touch this icon while the RX is stopped for manual suction start/stop.
(White: Stopped, Green: Running)

- (6) [Blow Cleaner] icon



Touch this icon for blow cleaner operation (internal control only).
(See Subsection 7.1A.5 [2].)

- (7) [Lappet-Ring Rail] icon



Touch this icon for manual lappet and ring rail operation. (See Subsection 7.1A.5 [3].)

- (8) [Doffer-Tray] icon (on RX with SCD only)



Touch this icon for manual doffer and tray operation. (See Subsection 7.1A.5 [4].)

- (9) [Independent Operation] icon



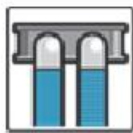
Touch this icon for the spindle and the draft roller to operate independently from each other. (See Subsection 7.1A.5 [5].)

- (10) [Optimum Stop booking] icon (special function)



When the bobbin fullness (%) for stopping the RX is set beforehand for replacing the travelers or changing the yarn specifications, the RX can be stopped automatically. (See Subsection 7.1A.5 [6].)

[2] Blow Cleaner Operation(Internal Control Only)



[Blow Cleaner]



Fig. 2 Blow cleaner operation screen

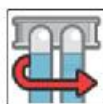
Touch the [MANUAL] icon on the top menu, and the [Blow Cleaner] icon to display the blow cleaner operation screen. Operate the blow cleaner on this screen. Touch one of the following icons to determine the operation mode:



Auto mode:
(Synchronized operation with the RX)

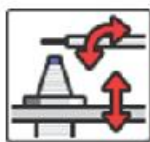


Manual mode:
(Constant operation irrelevant to the RX operation)



Escape mode:
(Forced escape operation)
(Turns green also upon automatic escape.)

[3] Manual Lappet-Ring Rail Operation



[Lappet-Ring rail]

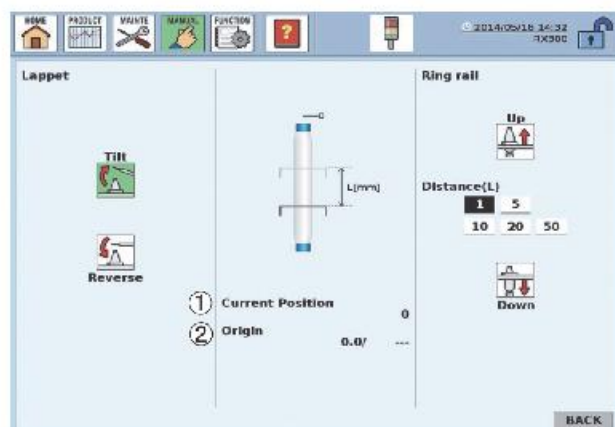


Fig. 3 Manual ring rail-lappet screen

Touch the [MANUAL] icon on the top menu, and touch the [Lappet-Ring rail] icon to display the manual lappet-ring rail screen.

NOTE: Operate after fully making sure there is nobody or no obstacle in the neighborhood.

(1) Manual lappet operation (from the left-hand side on the screen)

Touch each icon for lappet tilt or reverse.



Lappet [Tilt] icon
(ON: Tilt state)



Lappet [Reverse] icon
(ON: Reverse state)

Explanation on screen display contents

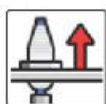
Current position ① : Current ring rail height

Datum position ② : Datum position: Position where the PRS8 turned from ON to OFF last time or the position where PRS8 OFF to ON is memorized during teaching

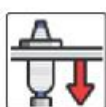
(2) Manual ring rail operation (from the right-hand portion on the screen)

- Select the traveling distance (L) from [1], [5], [10], [20] and [50] (mm).
- Touch the rail-up/down icon for the desired direction to move the rail for the selected traveling distance.

NOTE: The rail does not move unless the lappet is reversed.



Rail [Up] icon



Rail [Down] icon

[4] Manual SCD Operation (on RX withSCD only)



Touch the [MANUAL] icon on the top menu, and touch the [Doffer-Tray] icon to display the manual SCD operation screen. Manually operate the doffer and tray on this screen.

NOTE: Operate after fully making sure there is nobody or no obstacle in the neighborhood.

Fig. 4 Manual SCD operation screen

(1) Manual doffer operation

Use the following icons for manual operation according to the doffing bar position:



Gripper [Release] icon
(ON: Release state)



Gripper [Grip] icon
(ON: Gripping state)



Bar [Up] icon



Bar [Down] icon



Bar [Open] icon



Bar [Close] icon

Explanation on screen display contents

Current position ① : Current doffer encoder position pulse

Datum position ② : Position where PRS22 turned from OFF to ON last time or position where PRS22 memorized OFF to ON in initial teaching

Feed count ③ : Current feed count/specified count

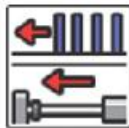
(2) Manual tray operation



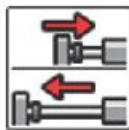
Tray feed [Clear] icon
(ON: Feeding incomplete)



Tray feed [Finish] icon
(ON: Feeding finished)



Tray [Feed] icon
(ON: Feeding state)



Tray [Back] icon
(ON: Returned state)

[5] Fleece Feeding-Out Auxiliary Movement(Electronic Draft Specification)

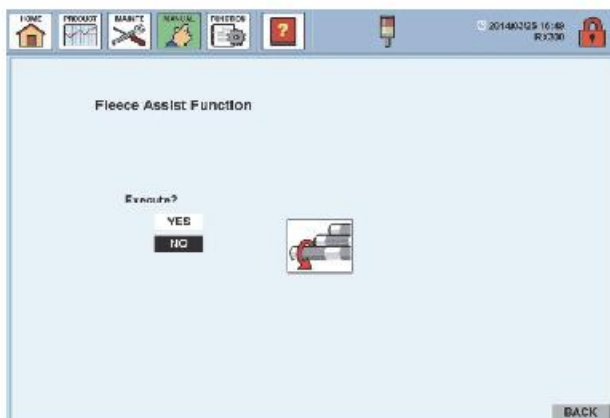
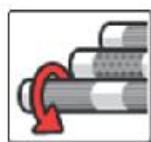


Fig. 5 Fleece feeding-out auxiliary movement operation

After roving has been passed through, the draft roller makes special movement to prevent the roving from being wound up around the top roller and to feed out fleece.

NOTE: Because the draft part makes special movement, the roving may snap.

Therefore, great care should be taken to operate the machine.



[FLEECE]



Fig. 6 Fleece feeding-out auxiliary movement operation

(1) Operation method

1. Touch the [MANUAL] icon in the top menu to open the manual operation screen.
2. Touch the [FLEECE] icon at the left bottom on the manual operation screen to open the fleece feeding-out auxiliary movement operation screen (Fig. 5).
 ※When starting the fleece feeding-out auxiliary movement. After selecting [YES], touch the [FLEECE] icon to start the movement.
3. During the fleece feeding-out auxiliary movement, the [FLEECE] icon becomes green. (Fig. 6)
 ※When interrupting the fleece feeding-out auxiliary movement. Touch the [FLEECE] icon again or press the Stop SW of the RX to decelerate and stop the movement.
4. When the movement has been complete as specified, the [FLEECE] icon becomes white and the screen changes to the initial screen in Fig. 5.

(2) Overview of the fleece feeding-out auxiliary movement

1. Suction operation
2. Standby for specified time
3. Rotation of the front roller
4. Stop of the front roller after specified time (about 10 seconds)
5. Rotation of the front, middle, and back rollers
6. Stop of all rollers after specified time (about 20 seconds).
7. Suction stop
 ※In this movement, spindle and lifting operations are not carried out.

[6] Independent Operation

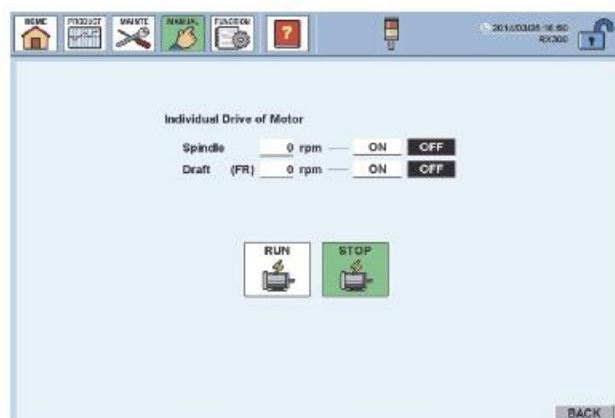


Fig. 7 Independent operation screen (initial screen)

[Independent
Operation]

Fig. 6 Independent operation screen (in operation)

The spindle and the draft roller (Electronic Draft Specification) operate independently from each other.

NOTE: The independent operation cannot be carried out during spinning.

Check the state of the RX and operate it with great care.

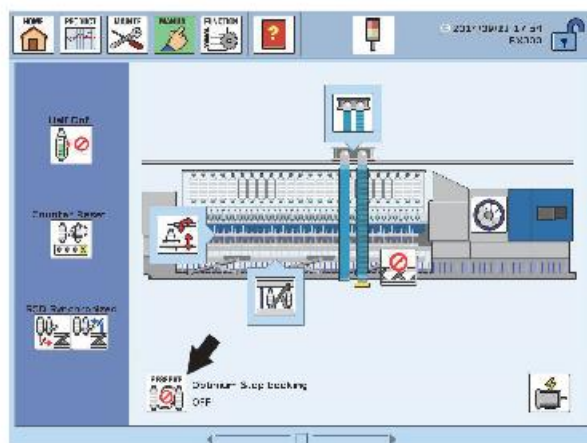
(1) Operation method

1. Touch the [MANUAL] icon in the top menu to open the manual operation screen.
2. Touch the [Independent Operation] icon at the right bottom on the manual operation screen to open the independent-operation operation screen (Fig. 5).
3. Input target rpm to the shaft that operates independently.
 ※Input the rpm of the front roller to the draft shaft.
4. Touch the screen to switch the shaft that operates independently to [ON].
5. Touch the [Independent Operation] icon and select [YES] to start the independent operation.
 ※During the independent operation, the tower lamp blinks in red and then in yellow. After this, the lamp is turned off. This process is repeated.
6. Touch the [Independent Operation] icon again to decelerate the operation and stop it.

[7] Optimum Stop Booking

The optimum stop booking is a function to "automatically stop operation upon arrival at the set bobbin fullness after the set doffing." This can be used when the bobbin fullness (%) for stopping the RX is known beforehand.

[7.1] Setting method



- (1) Set the key switch to the DATA-SET position.
- (2) Touch the [MANUAL] icon on the top menu to display the manual operation display screen.
- (3) Touch the [Optimum Stop booking] switch to open the optimum stop booking screen.
- (4) Set the desired doffing and bobbin fullness for stop booking.
 - For stop within the current doffing (before arrival at the full bobbin), input "0" to the denominator of the doffing count and input a value greater than the current % to the bobbin fullness.
 - For stop at the next doffing or later, input the denominator of the doffing count and the bobbin fullness. (For the next doffing, input "1" for the doffing count.)
- (5) Touch the [ON] key. Be sure that the box is lit.
- (6) Touch the [SET] key.
- (7) Return the key switch to its previous position.



- (8) Make sure that the optimum stop booking is valid.

[7.2] Forced optimum position stop operation

M-300

RX Booking Stop

Message on automatic stop

If bobbins exceed the preset wound percentage (BO), the RX starts optimum-position stop operation while displaying the message shown at left and lighting the red lamp.



Replace the travelers or change the yarn specifications.



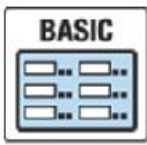
Reset the RX and then restart it.

7.1A.6 Spinning Condition Setting(FUNCTION-BASIC)

[1] Sub Menu Configuration



[FUNCTION]



[BASIC]



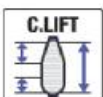
Sub menu

Fig. 1 Spinning condition setting screen

Touch the [FUNCTION] icon on the top menu, and touch the [BASIC] icon to display the spinning condition setting screen.
The sub menu appears on the left side.



Touch this to set the basic spinning conditions such as the yarn count and twist multiplier.



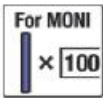
Touch this to set bobbin yarn shape such as the total lift and chase.



Touch this for setting related to traveler information and change warning.



Touch this for setting related to roving information and change warning.



Touch this for setting the efficiency for production calculation and the number of spindles during production with partial spindles.

[2] Spinning Yarn Setting (YARN)

■ Spinning yarn setting items

Symbol	Description	Unit	Minimum	Maximum
F	Fiber type	Max. 10 alphanumeric characters		
Nx (Ne)	Yarn count (Ne)	Ne	2.0	300.0
W (gr/30 yd)	Roving weight (gr/30 yd)	gr/30 yd	20	999
TM	Twist multiplier (British)	—	1.50	10.00
G	Yarn weight	g	10.0	200.0
K	Pitch coefficient	—	4.0	9.0
BD	Break draft	—	1.00	2.30
TDf	Draft correct	%	50	150
Tf	Twist correct	%	50	150
YP	Yarn pattern selection	—	Normal	Slub ^{*1}
CPT	Compact	—	Used	Unused
RG	Roller gauge	Max. 8 alphanumeric characters		
CC	Cradle clip	Max. 8 alphanumeric characters		

^{*1}: Fancy yarn specification only (Indication varies with the yarn pattern: [Multi-count], [Multi-twist], [Multislub])

[2.1] Explanation on basic setting screen

Use the basic spinning condition setting screen for setting basic conditions related to the spinning yarn. Select the [YARN] icon on the sub menu and touch the [BASIC] switch to display this screen.



Fig. 2 Basic spinning condition setting screen

- (1) Setting the yarn count and twist count
On the RX, the basic rpm of each draft shaft is calculated from the total draft operated from the set roving weight (W) and yarn count (Ne) and the set break draft (BD).

$$\text{Total draft} = W \times Ne / 250$$

REFERENCE:

To adjust the production yarn count, change the draft correct (TDf).
(Increase the TDf to obtain thinner yarn.)
Input the twist multiplier (TM) to set the twist count (T.P.I.).

$$\text{T.P.I} = \text{TM} \times \sqrt{Ne}$$

REFERENCE:

To adjust the twist count, change the twist correct (Tf). (Increase Tf for stronger twist.)

NOTE: In the case of fancy yarn, yarn count and twist count can only be set by the FYSDC (fancy yarn setting creator).

- (2) Setting the full (production) bobbin yarn length

The full bobbin yarn length is calculated from the set yarn weight (G), and the actual full bobbin is determined by measuring the front roller rpm.

$$\begin{aligned} \text{Full bobbin yarn length} \\ = Ne \times G \times 768.1 / 453.6 \end{aligned}$$



Fig. 3 Basic spinning condition setting screen

7.1A.6 Spinning Condition Setting(FUNCTION-BASIC)

(3) Yarn pitch setting

The pitch of the yarn wound on the bobbin is set by means of the pitch coefficient (K). In lifting chase control, The following average pitch calculation is used:

$$\text{Average yarn pitch} = K / 1.06 / \sqrt{Ne}$$

(4) Yarn pattern setting

If the fancy yarn pattern is set on a frame with fancy yarn specification, the yarn pattern (YP) selection items are displayed. The selection depends on the fancy yarn pattern data being set on the frame. Select [NORMAL] to spin normal yarn.

Yarn pattern selection (YP)

- [NORMAL]
- [SLUB]
- [MULTI COUNT]
- [MULTI TWIST]
- [MULTI SLUB]
- [OTHERS]

On the RX with the compact device, CPT for selecting if the compact suction motor is used or unused appears. Select [USED] for compact yarn spinning.

Compact (CPT): [USED] [UNUSED]

(5) Other settings

The following items can be set for management recording though not used for machine control:

- Fiber type (F)
- Roller gauge (RG)
- Cradle clip (CC)
- Break draft (BD)

NOTE: Keep the box blank if not used.

(6) Caution for setting

Since each setting on this screen is important for the yarn quality, set it correctly.

While key switch operation is necessary for ordinary setting change, further protection by password is possible on this screen.(See Subsection 7.1A.9 [4].)

[2.2] Explanation on other screens

The spinning condition screen consists of the [BASIC], [FB FIX], [COMPACT], and [INFO.] pages.

Touch each switch to display the respective screen page.



Fig. 4 FB fix setting screen

(1) FB fix setting screen

On this screen, set the conditions for the yarn to be spun upon FB lowering under extraordinary conditions for the purpose of stabilizing bunch winding and yarn cutting by the cutter.

[AUTO], [MANUAL], and [OFF] can be selected for setting.

1. Operation for [AUTO] is as follows:

	Automatically set values	
Yarn count	Yarn number count	Twist count
≤ 10	20	Calculate values
$10 < \leq 15$	30	Calculate values
$15 < \leq 20$	40	Calculate values
Other	OFF	OFF

2. The values shown in the table below are used for [MANUAL] operation.

FB Fix (Manual) Screen Setting Items

Symbol	Description	Unit	Min.	Max.
Nxf	Yarn count upon FB automatic lowering	Setting	2.0	300.0
TMf	Twist multiplier upon FB automatic lowering	—	1.50	10.00

3. This operation is not conducted for [OFF].

EXAMPLE: For doffing in thick yarn spinning, the spinning yarn is made thinner at automatic lowering for smoother cutting operation.

NOTE: Carefully set because abrupt yarn count change may obstruct smooth spinning and increase in broken yarn during automatic lowering.



Fig. 5 Compact (suction pressure) setting screen

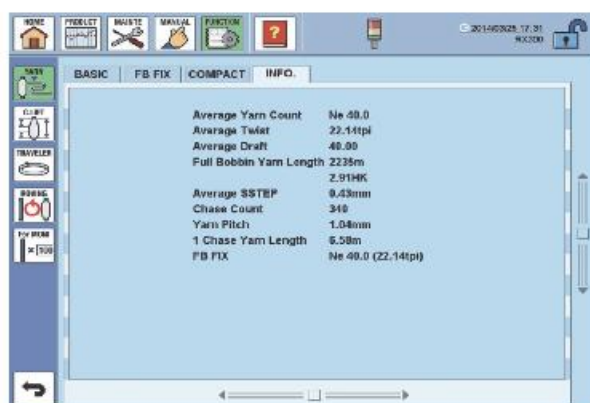


Fig. 6 Information screen

(2) Compact suction pressure setting screen
(RX with the compact device only)

Use this screen to set the suction pressure of the compact spinning suction motor.

The suction pressure can be set at four levels or be selected automatically according to the specified spinning yarn count.

※Refer to A.7.5 of the Instruction Manual of the compact spinning set.

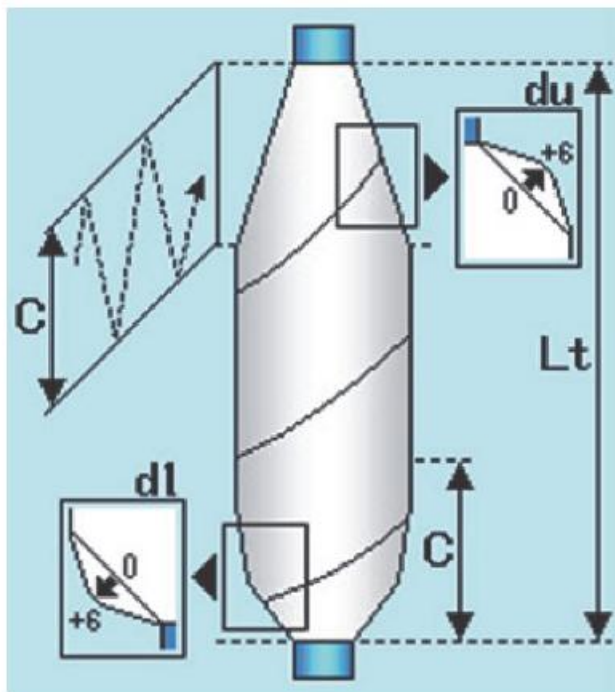
(3) Information screen (calculation results)

This screen display the results of internal calculation based on the current setting values.

[3] Bobbin Yarn Shape Setting (C. LIFT)

■ Bobbin shape setting items

Symbol	Description	Unit	Min.	Max.
LT	Total lift	mm	100	255
C	Chase length	mm	30	75
du	Upper depressing	—	0	+6
dl	Depressing level	—	0	+6



The bobbin shape is controlled based on the full bobbin yarn length calculated from yarn count (Ne) and yarn weight (G) in the spinning conditions while calculating the standard ring rail speed and shaper step (chase lift) obtained from such fixed conditions as the ring diameter and bobbin constant, and the set chase length (C) and the lift (LT : Length from the start to the end positions of winding).

NOTE: Parallel winding is the base irrelevant to the bobbin shape.

NOTE: The top shoulder shape can be set at six stages by means of the upper depressing level (du).

NOTE: The bottom shoulder shape can be set in six stages by means of the depressing level (dl).

NOTE: The actual full-bobbin diameter is related to the yarn weight (G) setting.

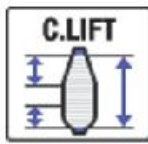
If bobbin rubbing should arise, decrease the yarn weight (G) setting.

NOTE: When a problem of roving getting loose occurs frequently in the winder process, set the level to 0.

REFERENCE:

- Set the ring diameter and bobbin shape on the initial setting-adjustment screen.
- Set the winding start position (L5) and the top bunch position (L6) when setting the RX operating conditions.

[3.1] Screen display



[C.LIFT]

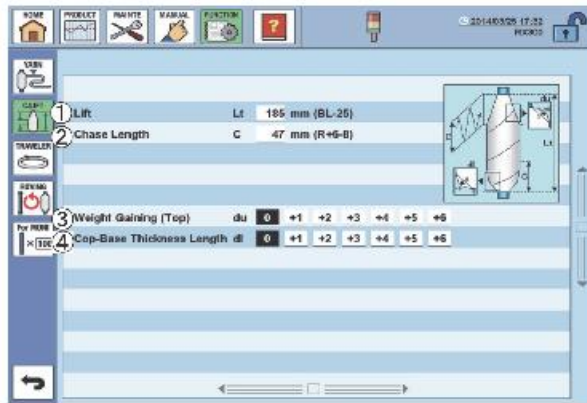


Fig. 7 Bobbin condition setting screen

Set basic bobbin conditions on the Bobbin Condition Setting Screen.

Touch the [FUNCTION] icon on the top menu, touch that appears upon the [BASIC] icon for spinning conditions, and then touching [C.LIFT] icon on the s Sub menu to display this screen.

[3.2] Setting itemssetting items

- ① Lift
- ② Chase Length
- ③ Upper Cop-Base Thickness Length
- ④ Cop-Base Thickness Length (Depressing)
 - The standard depressing level is [+3].
 - If the depressing level is [0], the bottom shoulder slope is sharp to reduce the winding capacity, but the influence on sloughing in the winder process decreases.

[4] Roving Change Warning Setting (ROVING)

■ Roving change warning setting items

Symbol	Description	Unit	Min.	Max.
Rov	Roving Name		0 character	16 characters
RovLen	Roving Length	Setting	100	40000
RovWarn	Roving Change Alarm	—	Valid	Invalid
RovCyc	Roving Change Cycle	Doff	0	99
RovStopSW	Automatic Stop SW	—	Valid	Invalid
RovStopRate	Automatic stop rate	%	0	100



[ROVING]



Fig. 8 Roving change warning setting screen

Use the roving change warning setting screen to set the roving warning information to display on the home screen.

Set on this screen the warning lamp display on the home screen and automatic stop reservation for doffing before roving change.

The roving change warning setting screen appears when touching the [ROVING] icon on the Sub menu after touching the [FUNCTION] icon on the top menu and the [BASIC] icon for spinning condition setting on the sub menu.

[4.1] Setting items

- ① Roving Name (Rov)
- ② Length (RovLen) : Use this for rough estimation of consumption forecast.
- ③ Roving Change Alarm (RovWarn) : Set either warning or no warning.
- ④ Roving Change Cycle (RovCyc)
- ⑤ Auto Stop Mode (RovStopSW)
- ⑥ Auto Stop Mode (RovStopRate)

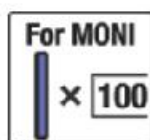
REFERENCE:

The automatic stop function before roving change automatically stops operation at the optimum position upon arrival at the automatic stop rate after doffing for roving change until the doffing after roving change cycle setting.

[5] Production Information Setting (For MONI.)

■ Production information setting items

Symbol	Description	Unit	Min.	Max.
PSP	Number of production spindles	—	0	1200
PCOFF	Production length correction	%	50.0	100.0



[FOR MONI]



Fig. 9 Production information setting items

Use the Production Information Setting screen to set the efficiency resulting from the actual number of production spindles and broken yarns to improve the accuracy of production by fiber type on the home screen or production information screen (in [PRODUCT] mode).

Touch the [FUNCTION] icon on the top menu, and the [BASIC] icon for spinning conditions. Then touch the [For MONI.] icon on the sub menu to display this screen.

[5.1] Setting items

- ① Number of spindle for production (PSP)
- ② Productive efficiency (PCOFF)

REFERENCE:

Production by fiber type is calculated as follows:

$$\text{Production (kg)} = (L \times 453.6 / 768.1 / \text{Ne}) \times \text{PSP} \times \text{PCOFF} / 100$$

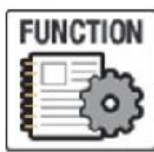
L: Spinning length per spindle [m] (Measured by detecting the front roller rpm.)

7.1A.7 Spindle Pattern Setting (PATTERN)

- On the RX, ten spindle patterns (one basic spindle pattern and nine selective spindle patterns) can be set at a time.
- The RX is operated either by pattern selected running in which only one out of ten memorized patterns is selected and repeated, or by pattern programmed running in which each of patterns 1 to 9 is repeated as many times as specified in the order of pattern 1 → pattern 2 → pattern 3 --- → pattern 9 before returning to the basic spindle pattern.

[1] Pattern Selection and Pattern Programming

[1.1] Pattern selected running



[FUNCTION]

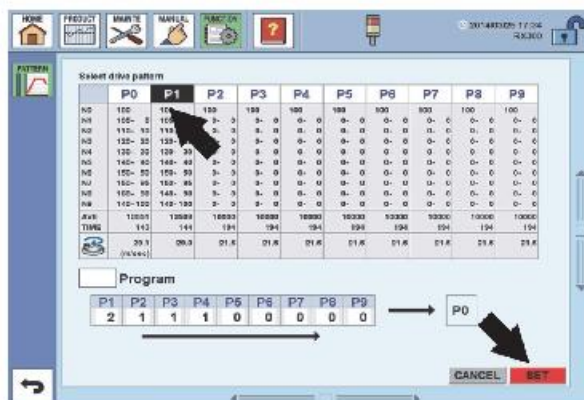


[PATTERN]

EXAMPLE: For operation with repeated P1.



- Set the key switch on the OE operation panel to the DATA-SET position.
- Touch the [FUNCTION] icon on the top menu, and touch the [PATTERN] icon for spinning conditions to display the pattern selection screen.
- Touch the [SELECT PATTERN] switch.



- Touch [P1].
- Touch the [SET] key.



- (6) Touch the [BACK] icon to return to the previous screen and confirm that pattern P1 has been selected.

REFERENCE:

Pattern 0 is the basic spindle speed change pattern.

[1.2] Pattern programmed running

- (1) Set the key switch on the OE operation panel to the DATA-SET position.
- (2) Touch the [FUNCTION] icon on the top menu, and the [PATTERN] icon for spinning conditions to display the pattern selection screen.
- (3) Touch the [SELECT PATTERN] switch.



- (4) Select [Program].
- (5) Repeat each pattern several times or input the count.
- (6) Touch the [SET] switch.



- (7) Confirm that programmed running has been set.

REFERENCE:

1. The setting range is between 0 to 99 (excluding 0).
2. When programmed running is selected, each pattern is repeated as many times as specified before returning to basic speed change pattern 0 and this cycle is repeated permanently until the next setting is made.

[2] Setting the Spindle Speed Shift Pattern

■ Parameters to be set (Pattern 0)

Symbol	Setting items
N0	Initial spindle speed
ACC1	Acceleration slope to the initial spindle speed
N1	1st spindle speed
(B1)	Wound-percentage up to 1st spindle speed
N2	2nd spindle speed
(B2)	Wound-percentage up to 2nd spindle speed
N3	3rd spindle speed
(B3)	Wound-percentage up to 3rd spindle speed
N4	4th spindle speed
(B4)	Wound-percentage up to 4th spindle speed
N5	5th spindle speed
(B5)	Wound-percentage up to 5th spindle speed
N6	6th spindle speed
(B6)	Wound-percentage up to 6th spindle speed
N7	7th spindle speed
(B7)	Wound-percentage up to 7th spindle speed
N8	8th spindle speed
(B8)	Wound-percentage up to 8th spindle speed
N9	9th spindle speed
(B9)	Wound-percentage up to 9th spindle speed

All of the ten spindle shift patterns should be set in the same format.

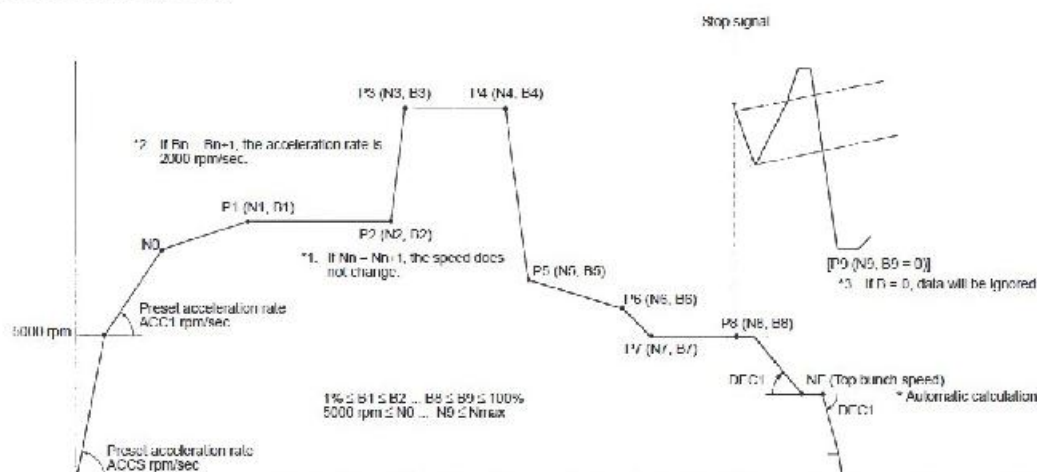
REFERENCE: $B1 \leq B2 \leq \dots B8 \leq B9$

■ Setting items for other than pattern 0

Pattern	Spindle speed	Wound percentage
Pattern1	N10 – N19	B11 – B19
Pattern2	N20 – N29	B20 – B29
Pattern3	N30 – N39	B30 – B39
Pattern4	N40 – N49	B40 – B49
Pattern5	N50 – N59	B50 – B59
Pattern6	N60 – N69	B60 – B69
Pattern7	N70 – N79	B70 – B79
Pattern8	N80 – N89	B80 – B89
Pattern9	N90 – N99	B90 – B99

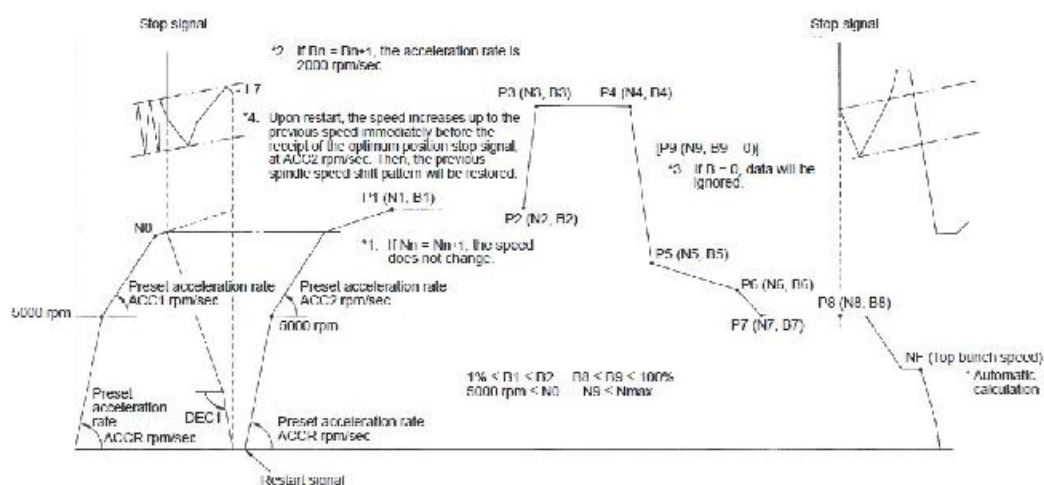
[2.1] Initial operation according to the above parameters (For pattern 0)

- (1) If the controller receives the start signal when the tappets are in the tilted position, it returns the tappets to the horizontal position and executes heaving operation. Then the spindle speed increases to 5,000 rpm at the preset acceleration rate of ACCS rpm/sec.
- (2) After reaching 5000 rpm, the spindle speed further increases to the preset initial spindle speed N0 at the preset acceleration rate of ACC1 rpm per second. The spindle speed changes along P1, P2 ... and then becomes constant at the preset final speed. (In the figure below, N9 is not used so N8 is the final speed.)

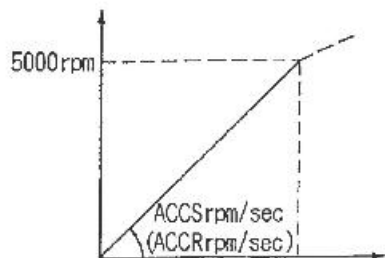


[2.2] Restart operation according to the above parameters (For pattern 0)

If the controller receives the optimum-position stop signal during spinning operation, the RX stops. Upon receipt of the start signal, the controller increases the spindle speed up to 5,000 rpm at the fixed acceleration rate of ACCR rpm/sec. Upon reaching 5,000 rpm/sec, the spindle speed is further increased up to the speed immediately before stop signal input at the preset acceleration rate of ACC2 (rpm/sec) to trace the preset speed pattern before stopping.

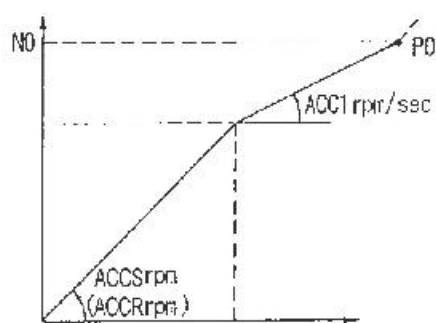


[3] Concept of Spindle rpm ChangePattern Setting (for Pattern 0)



Fixed acceleration rate for starting up

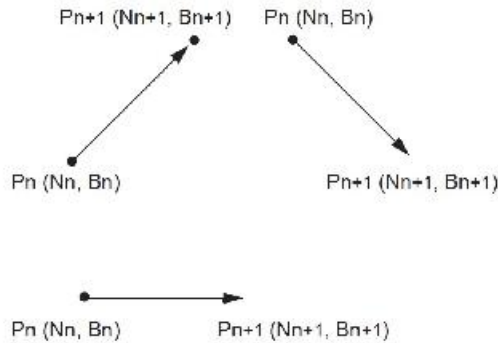
- (1) The spindle speed increases from 0 rpm to 5,000 rpm at the preset acceleration rate of ACCS rpm/sec (ACCR rpm/sec for restart). AACS and ACCR are preset according to the Rx running condition.



Initial spindle speed setting

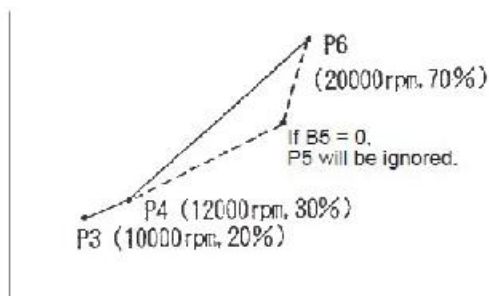
- (2) Set the initial spindle speed N0. Acceleration rate ACC1 rpm/sec until attainment of the initial speed is set according to the Rx running condition.

- (3) Set the 1st through 9th spindle speeds in combination with the corresponding wound-percentage.

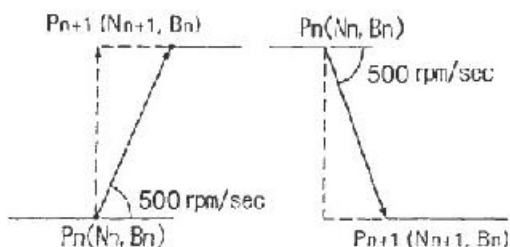


Spindle speed change between two setting points

N3	10000rpm
B3	20 %
N4	12000rpm
B4	30 %
N5	14000rpm
B5	0 %
N6	20000rpm
B6	70 %



Acceleration Curve with "0" Wound-percentage



Stepped Acceleration/Deceleration

[4] Spindle Pattern rpm Setting Method

[4.1] Displaying spindle pattern setting screen

Touch the [FUNCTION] icon on the top menu and touch the [PATTERN] icon for spinning conditions from the displayed function menu to display the spindle pattern screen.



Fig. 1 Spindle pattern screen

Explanation on screen display contents

- ① [SELECT PATTERN]: Touch this to select the running pattern.
- ② Running pattern display (Dark blue background color)
- ③ rpm setting display for each pattern
(***x100 [rpm] - ** [%])
- ④ Calculated values
AVE : Average revolving speed (rpm)
TIME : Full bobbin time [minutes]
- ⑤ Traveler speed [m/sec]

[4.2] Changing the operation pattern



Fig. 2 Pattern selection screen



Fig. 3 Pattern change

P0	P1	P2	P3	P4	P5	P6	P7	P8	P9
----	----	----	----	----	----	----	----	----	----

(Spindle pattern screen display upon changing to P5)

- (1) Set the key switch to the DATA-SET position.
- (2) Touch [SELECT PATTERN] ① on the spindle pattern screen (Fig. 1) to display the pattern selection screen.

- (3) Touch the box of the pattern desired to be changed. The box changes from white to black.

REFERENCE:

For programmed running, input the number of repetitions for each pattern (P1 - P9) and select [Program].

- (4) Touch the [SET] switch at right bottom if the setting is OK. The spindle pattern screen (Fig. 1) appears to complete the change.
- (5) Return the key switch to its previous position.

REFERENCE:

Touch the [CANCEL] switch for cancellation.

[4.3] Setting the operation pattern



Fig. 4 Spindle pattern screen

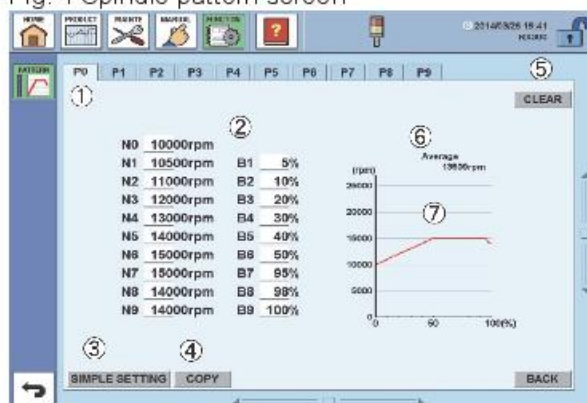


Fig. 5 Pattern setting screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch each pattern-rpm setting box on the spindle pattern screen to display the pattern setting screen (Fig. 5).

Explanation on the screen display contents

- ① Displayed pattern (black)
[P0] to [P9]: Touch one of these for switching to another pattern display.
 - ② Set rpm and bobbin fullness (%): N0 - N9, and B1 - B9
 - ③ [SIMPLE SETTING]: Touch for simple input of the initial rpm and maximum rpm.
 - ④ [COPY]: Touch this for copying from one pattern to another.
 - ⑤ [CLEAR]: Touch this to clear the pattern data once.
 - ⑥ Average rpm display
 - ⑦ Input pattern graphic display
- (3) For setting change, touch the desired box to display the keyboard. (The selected item changes from white to yellow.)

Input the desired value from the keyboard.

REFERENCE:

- Carry out simple setting (See Subsection 7.1A.6 [4.4].)
- Input after clearing the pattern. (See Subsection 7.1A.6 [4.5].)
- Copy the pattern. (See Subsection 7.1A.6 [4.6].)

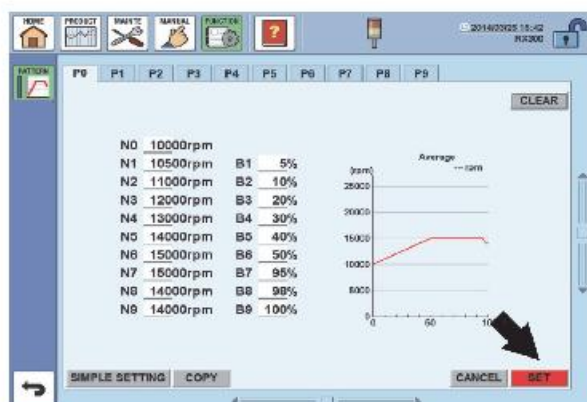


Fig. 6 Screen after setting

- (4) After the end of all inputs, check for no abnormal input and touch the [SET] switch at the right bottom.

REFERENCE:

Touch the [CANCEL] switch for cancellation.

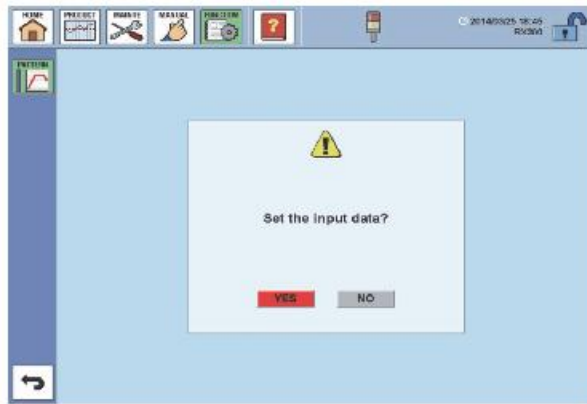


Fig. 7 Screen after setting

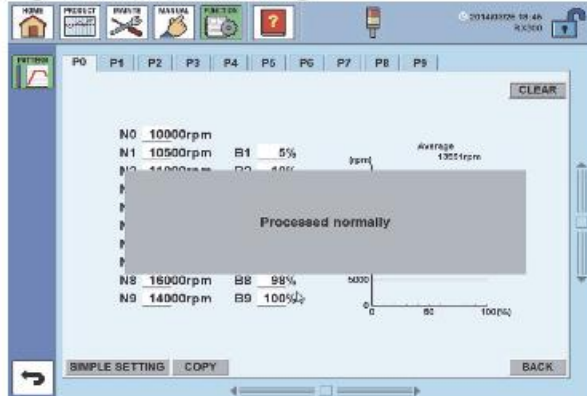


Fig. 8 Normal end

- (5) The confirmation screen appears upon touching the [SET] switch.
(Confirmation is prompted since the spindle pattern can be changed during operation.)

Touch [YES] to enter the setting, or [NO] to cancel the setting input.

- (6) Setting change is completed.

REFERENCE:

- Touch the [BACK] switch at the right bottom to return to the spindle pattern screen (Fig. 4).
- Touch the [BACK] icon on the sub menu to return to the function menu.

- (7) Return the key switch to the original position.

[4.4] Operation pattern simple setting

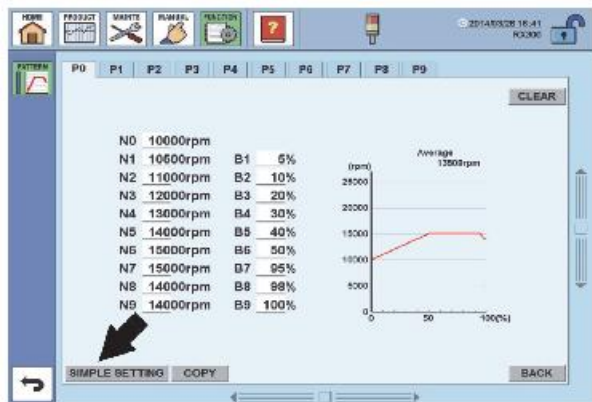


Fig. 9 Pattern setting screen

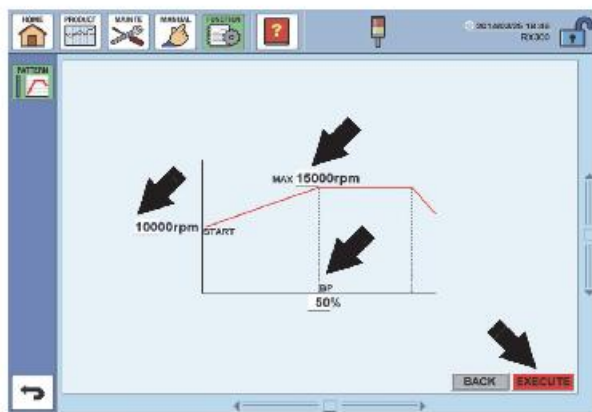


Fig. 10 Simple setting screen

Touch the [SIMPLE SETTING] switch on the pattern setting screen to display the simple setting screen (Fig. 10).

On this screen, input the initial speed (START), maximum speed (MAX) and maximum bobbin percentage (BP) and touch the [EXECUTE] switch.

Then, N0 - N9 and B1 - B9 are automatically input on the pattern setting screen

NOTE: The setting is not finalized in this stage.

Touch the [SET] switch displayed at right bottom on the pattern setting screen (Fig. 9) to enter the setting. After individual value correction as needed, touch [SET] for finalization.

[4.5] Clearing the operation pattern

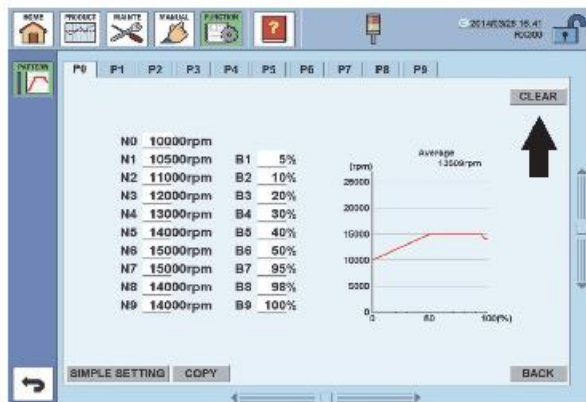


Fig. 11 Pattern setting screen

Touch the [CLEAR] switch on the pattern setting screen to display the clear confirmation screen (Fig. 12).



Fig. 12 Clear confirmation screen

Touch [YES] for clearing to N0 - 10000 rpm, N1 - N9 to 0 [rpm] and B1 - B9 = 0[%].

NOTE: The setting is not finalized in this stage.

Touch the [SET] switch displayed at right bottom on the pattern setting screen (Fig. 11) to finalize the setting. Touch [NO] for cancellation.

[4.6] Copying the operation pattern

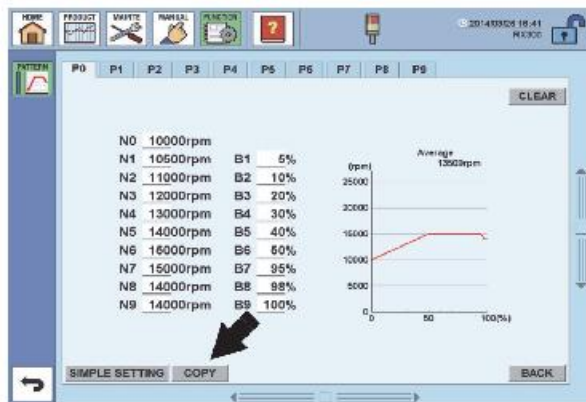


Fig. 13 Pattern setting screen

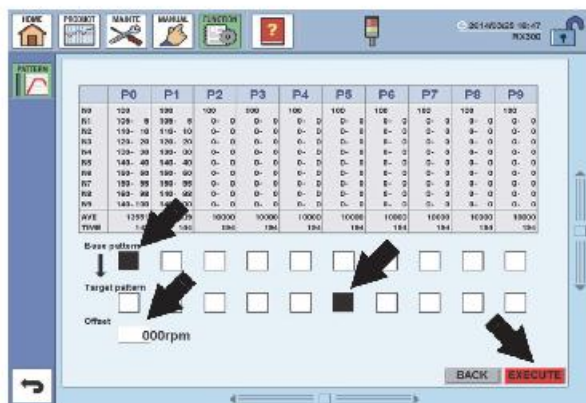


Fig. 14 Copy screen

Touch the [COPY] switch on the pattern setting screen to display the copy screen (Fig. 14).

This screen allows copying or offset copying between patterns.

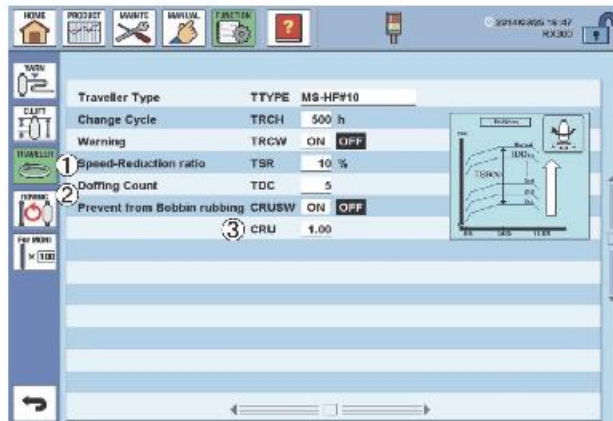
- (1) Select the base pattern (copying source).
Touch the box to turn it black. (Only one pattern selectable)
- (2) Select the target pattern (copying destination). Touch the box to turn it black. (Multiple selection allowable)
- (3) Input the offset rpm.
 - Inputting 0 causes copying as it is.
 - Inputting “-500”, for example, causes copying with each of N0 to N9 reduced by 500 wpm.
- (4) Confirm the selection and input, and touch the [EXECUTE] switch.

NOTE: The setting is not finalized in this stage. Touch the [SET] switch at right bottom on the pattern setting screen (Fig. 13) to finalize the setting. Touch the [BACK] switch for cancellation.

[5] Setting Traveler Running-in



[TRAVELER]



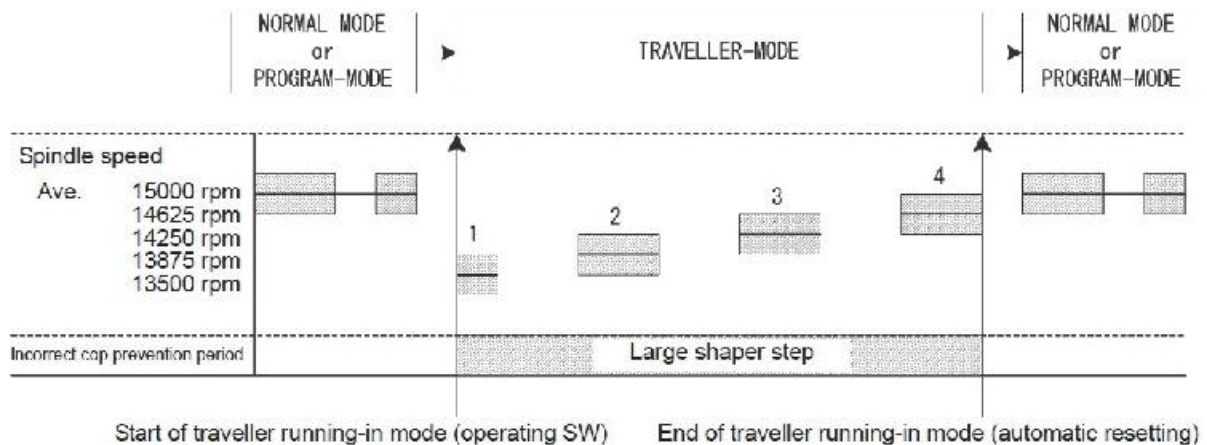
Touch the [FUNCTION] icon on the top menu, touch the [BASIC] icon for spinning conditions, and touch the [TRAVELER] icon on the sub menu to display the screen for setting traveler running-in.

■ Setting items

- ① Speed-Reduction ratio (TSR)
 - Input the overall deceleration rate for the running pattern being selected.
 - Initial value: 10% (Range: 0 to 20%)
- ② Doffing count (TDC)
 - Initial value: 5 times (Range: 0 to 10 times)
- ③ Bobbin diameter correcting coefficient (CRU)
 - Input the coefficient to prevent bobbin rubbing during traveler running-in.
 - Initial value: 1.00 (Range: 0.80 to 1.00)

[5.1] Traveller running-in mode

EXAMPLE: For average speed of 15,000 rpm, speed-reduction ratio of 0.90 and doffing count of 4 times in normal mode:



As against the current spindle pattern (Px), the spinning is operated with speed reduction for the set doffing count. Automatic resetting to the original spindle pattern (Px) occurs upon completion of the set doffing count.

The doffing count of the pattern program is not updated during traveller running-in mode in pattern program operation.)

For the operation pattern with speed reduction, the reduction ratio for the current operation pattern and the doffing count are set.

Speed-reduction ratio (TSR) : Initial value 10% (range: 0 to 20%)

Doffing count (TDC) : Initial value 5 (range 0 to 10)

Speed at the first doffing : $N_x \times (1 - \text{TSR}/100)$

Speed at the second and subsequent doffing: Speed calculated by decreasing the reduction rate preset for the operation pattern according to the doffing count.

The spindle during traveller running-in mode is set at the level obtained by multiplying that in the operation pattern in the normal mode by the reduction ratio for each cop percentage. (Speed reduction at the same ratio as a whole)

In the traveller running-in mode, the incorrect cop prevention function applies. (Setting value: CRU)

[5.2] Setting the traveler running-in program

Running-in after traveler replacement is possible by simple operation.

■ Switching to traveler running-in mode

- (1) Touch the traveler change warning icon on the home screen to open the traveler change warning screen (Fig. 16).



Fig. 15 Home screen (Ordinary operation mode)



Fig. 16 Traveler replacement warning screen

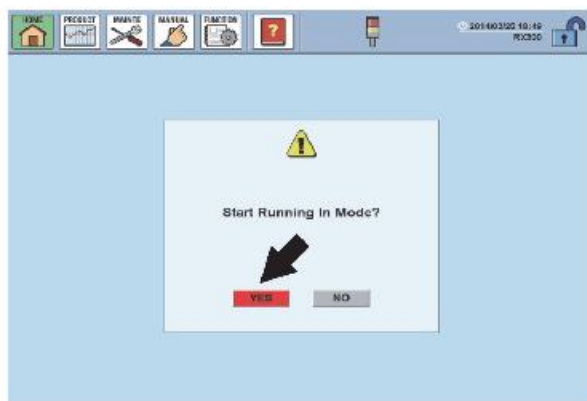


Fig. 17 Confirmation screen

- (2) On the confirmation screen (Fig. 17) displayed by touching the [Running In] switch, touch [YES] to turn the [Running In] switch light blue to start operation in the traveler running in mode from the next RX startup.

REFERENCE:

- It is possible to select need or no need of key switch turning to the DATA-SET position on the screen displayed upon touching the [PROTECT] icon in user setting. (See Subsection 7.1A.9 [4].)
- The traveler running in mode is automatically canceled upon completion of the set doffing count.
- For the operation in the traveler running-in mode, see Subsection 7.1A.7 [5.1].

7.1A.7 Spindle Pattern Setting (PATTERN)



Fig. 18 Traveler replacement warning screen (Traveler running-in mode)

- (3) Touch the [BACK] switch at right bottom to return to the home screen (Fig. 15).



Fig. 19 Home screen (Traveler running-in mode)

During traveler running-in operation, the ring traveler icon and a fractional number appears in the central part on the home screen.

EXAMPLE: When the “current doff count/set doff count” in the running-in operation mode is 1/5:



7.1A.8 Setting Related to Startup-Stopping

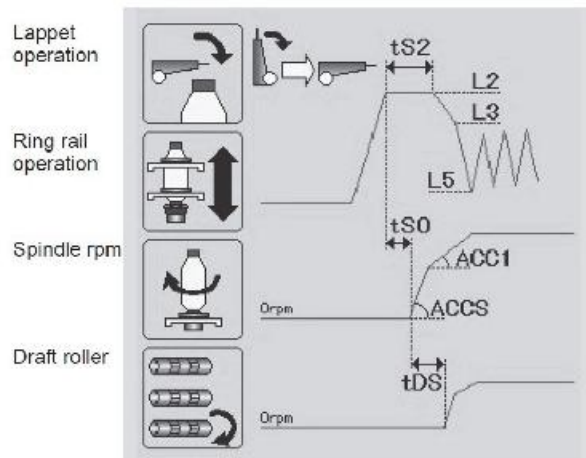
[1] Heaving

Restarting after doffing involves heaving.

■ Setting items for heaving

Symbol	Name	Unit	Minimum	Maximum	Initial value
L2	2nd moved-up position during heaving	mm	20	200	65
L3	Moving-down speed change position	mm	0	100	30
L5	Winding start position	mm	0	40	10
tS0	Motor start time	sec	-3.0	9.9	0.4
tS2	Second moving-up time	sec	0.0	9.9	0.8
tDS	Draft delay start time	sec	0.0	9.9	0.2
ACCS	Acceleration rate during heaving (up to 5000 rpm)	r/s	500	3000	1000
ACC1	Acceleration rate during heaving (5000 rpm - N0)	r/s	500	3000	2000

[1.1] Explanation on operation



(1) Ring rail operation

The lappet is reversed upon RX startup and the ring rail rises from the 1st moved-up position (L1) to the second moved-up position (L2).

After lapse of tS2 at the 2nd moved-up position, the ring rail moves down and then goes down quickly from the moving-down speed change position (L3).

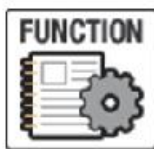
Normal chase operation starts upon arrival at the winding start position (L5).

(2) Spindle and draft roller operation

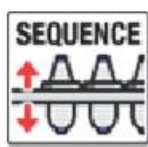
The spindle starts upon lapse of the motor start time (tS0) after ring rail arrival at the secondary rise position (L2).

After acceleration to 5000 rpm at a rate of ACCS, the spindle is accelerated to the initial speed (N0) at a rate of ACC1, and operates according to the set rpm pattern. The draft roller starts upon lapse of the draft delay start time (tDS) and is then operated in synchronism with the spindle speed.

[1.2] Setting screen



[FUNCTION]



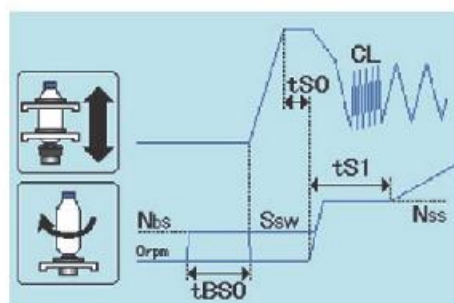
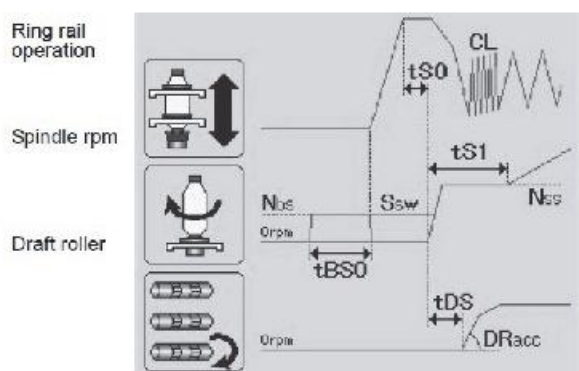
[SEQUENCE]

Touch the [FUNCTION] icon on the top menu, and touch the RX operating condition icon on the displayed function menu to open the page for setting heaving.

[1.3] Applied setting

■ Applied setting items

Symbol	Name	Unit	Minimum	Maximum	Initial value
Nbs	Individual spindle speed before second moving-up	rpm	0	5000	500
tBS0	Nbs time	sec	0.0	9.9	0.0
Ssw	Slow speed during 2nd moving-up	—	Valid	Invalid	Invalid
Nss	Heaving 1st constant speed	rpm	0	5000	3000
tS1	Nss time	sec	0.0	9.9	0.0
DRacc	Draft acceleration rate during heaving	rpm/s	50	300	100
CL	High-speed winding count during heaving	—	0	9	0



- (1) Individual spindle speed before second moving-up with heaving
Rotate the spindle individually before second moving-up after restarting heaving. Set the spindle speed (Nbs) and rotating time (tBS0).

REFERENCE:

Invalid if tBS0 = 0

- (2) Individual spindle rotation during second moving-up with heaving
Set the individual slow spindle rotation during second moving-up (SSW) after restarting heaving to [Valid].

REFERENCE:

The speed reaches the individual spindle speed (Nbs) before second moving-up.

- (3) Constant-speed heaving operation
During spindle acceleration after startup, the spindle rotates at the set rpm (Nss) for the set time period (tS1).
- (4) High-speed winding with heaving
After the end of normal heaving operation (arrival at the L5 position), the ring rail is operated for chasing at a speed faster than the ordinary level as long as the set number of windings (CL).

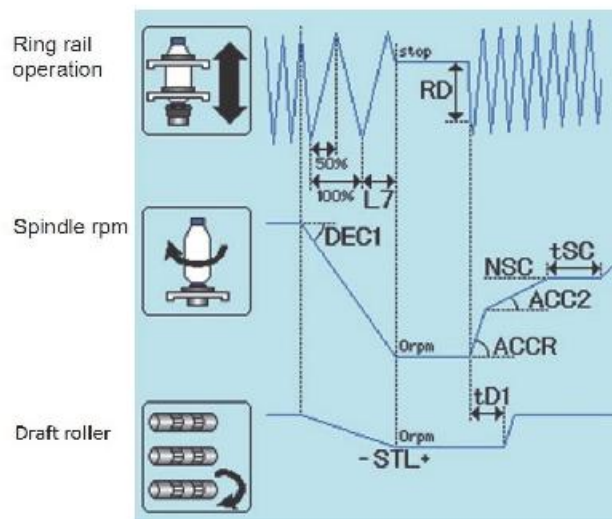
REFERENCE:

- Invalid if CL = 0
- The set CL count is 1 for half chase.
- High-speed chase operation continues to the upper end of the chase if set to an odd number, or to the lower end of the chase if set to an even number.

[2] Stopping at Optimum Position

■ Setting items for stopping at optimum position

Symbol	Name	Unit	Minimum	Maximum	Initial value
L7	Optimum stop position	%	0	100	70
DEC1	Deceleration rate	rpm/s	200	2000	1000
STL	Stop synchronization level (for optimum stop)	—	0	+4	+1



The RX stops at the optimum position sometime after its STOP switch is pressed.

In stopping at the optimum stop position, the spindle deceleration starting point is automatically calculated to stop the ring rail at the set position after RX deceleration at a rate of DEC1.

When stopping the RX before full bobbin, the ring rail is stopped at the position where broken yarn upon restarting would be the minimum.

(1) Optimum stop position (L7)

Set the ring rail stop position as against the chase operation by % (0 - 100).

Set the chase upward movement start point as 0%, chase upper end as 50%, and chase downward movement starting point as 100%.

EXAMPLE: If set to 75%

The ring rail is stopped with the half position of the chase length during downward chase as the target.

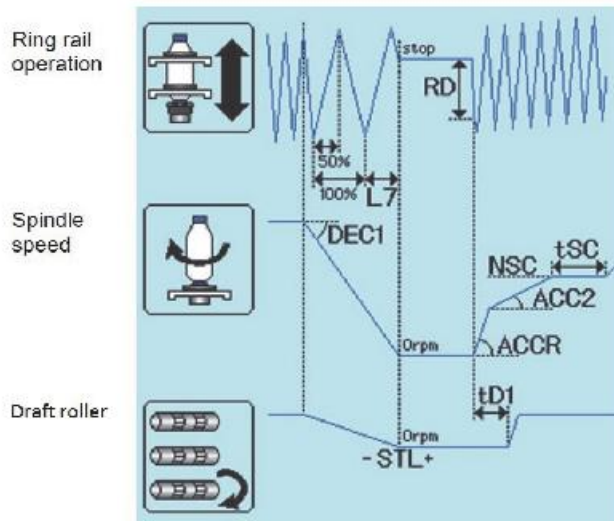
(2) Stop synchronization level (STL)

- The draft roller comes to a synchronized stop by measuring the spindle rpm.
- The draft stop timing can be adjusted as follows:
 1. Increase STL to retard draft stopping.
 2. Decrease STL to advance draft stopping.
- If the spindle and draft stop timings are abnormally deviated, make adjustment.

[3] Restarting Operation

■ Setting items for restarting operation

Symbol	Name	Unit	Minimum	Maximum	Initial value
RD	Down-movement of the ring rail at restart	mm	0.0	50.0	10.0
tD1	FR delayed start time	sec	0.0	1.0	0.2
ACCR	Acceleration rate at heaving (- 5000 rpm)	r/s	500	2000	1000
ACC2	Acceleration rate at restart	rpm/s	500	2000	2000
NSC	Cushion restart rpm	rpm	5000	25000	10000
tSC	NSC time	min	0.0	9.9	0.0



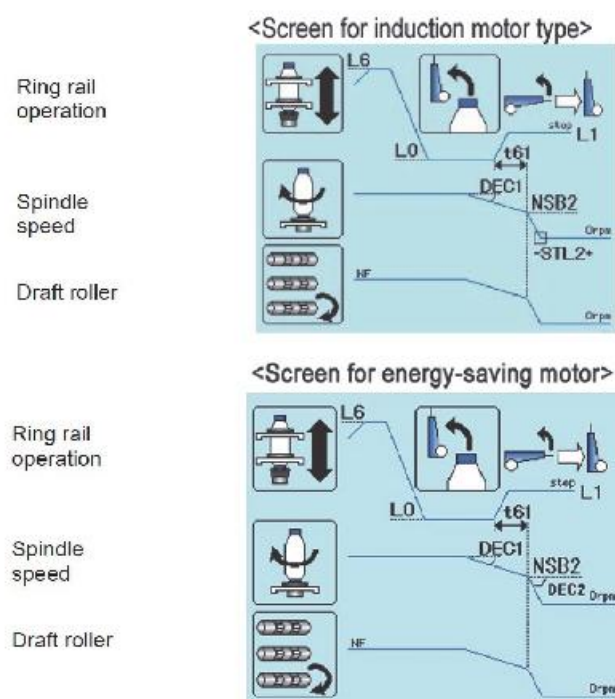
When the RX start switch is pressed, the spindle is accelerated to 5000 rpm at a rate of ACCR, and then to the target rpm in the spindle pattern at a rate of ACC2.

- (1) Draft delayed start
The front roller starts upon lapse of FR start delay time (tD1) after the start of spindle rotation to decrease broken yarn at the start.
(This does not function if RD = 0)
- (2) Snarl removal operation.
If RD is set, the spindle starts acceleration after the ring rail goes down as much as RD after the start switch is pressed.
(This does not function when tSC = 0.)
- (3) Cushion restart
If broken yarn occurs frequently at restarting, it is possible to operate the RX at a less speed for a fixed time until completion of yarn connection.
(This does not function when tSC = 0.)

[4] Full Bobbin Stop Operation

■ Setting items for full bobbin stop operation

Symbol	Name	Unit	Minimum	Maximum	Initial value
L1	1st moved-up position	mm	-10	50	10
t61	Spindle braking start timing	sec	0.0	2.0	0.5
NSB2	Spindle speed at the start of braking	rpm	800	2000	1200
STL2	Stop synchronization level (Induction motor type only)	—	0	+4	+2
STL3	Synchronization stop level (energy-saving motor type only)	—	0	+6	+3
DEC2	Deceleration rate 2 (energy-saving motor type only)	rpm/sec	500	3500	2500



When the FB stop condition such as attainment of the production yarn length or half doffing yarn length, the ring rail automatically moves down and the RX is stopped.

(1) End of chase operation

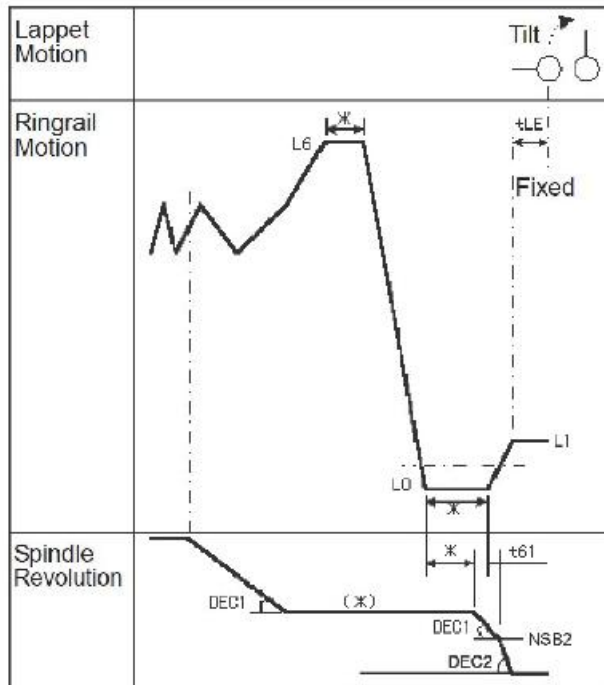
When the FB condition is satisfied, the spindle speed is reduced to the spindle speed to NF (speed before stopping calculated automatically) at a rate of DEC1.

When the ring rail approaches the uppermost chase point after attaining NF rpm, it shifts to top bunch operation.

REFERENCE:

If the top bunch is not set, the ring rail moves down automatically. (See Subsection 7.1A.8 [5] for the top bunch setting.)

In case of top bunch



(* Automatically calculated if you adjust the No. of bunch turns and back windings)

(2) Top bunch operation

Upon completion of the chase operation, the ring rail moves up to the top bunch position (L6) and stays there.

Upon lapse of the top bunch time length (calculated automatically), the ring rail terminates the top bunch operation and shifts to automatic moving-down operation. (For the adjustment of the number of top bunch windings, see Subsection 7.1A.8 [5])

(3) Automatic moving-down operation

The ring rail moves down to the bottom bunch position (L0), and stays there. (See Subsection 7.1A.8 [5] for the adjustment of number of advance windings.)

Upon lapse of the bottom bunch time length (calculated automatically) to form the bottom bunch, the ring rail shifts to the 1st moving-up operation. (For the adjustment of the number of bottom bunch windings, see Subsection 7.1A.8 [5].)

(4) 1st moving-up operation

After forming the bottom bunch, the ring rail moves up to the 1st moved-up position (L1). The spindle speed is decelerated at a rate of DEC1 to reach NSB2 upon lapse of the spindle brake start timing (t61) after the start of 1st moving-up, and the spindle is stopped suddenly by the inverter brake (Induction motor type).

※With the energy-saving motor type, the spindle speed is decelerated rapidly at a rate of DEC2 after NSB2 is reached.

REFERENCE:

The inverter brake is operated to immediately before perfect stopping. The stop synchronization level STL2 controls the braking end timing. The braking time increases with the STL2.

The draft stops when NSB2 is attained. The lappet is automatically tilted after the spindle stops.

[5] Adjustment of the Numbers of Top Bunch and Back Windings

■ Setting items for adjusting bunch and advance windings

Symbol	Name	Unit	Minimum	Maximum	Initial value
L6SW	Top bunch	—	Valid	Invalid	Valid
L6	Top bunch position	mm	155	255	200
nT	Number of top bunch windings	—	-1	+1	0
ADW	Number of advance windings	—	-3	+3	0
L0	Bottom bunch position	mm	-10	50	-8
nB	Number of bottom bunch windings	—	-1/2	+3/2	0

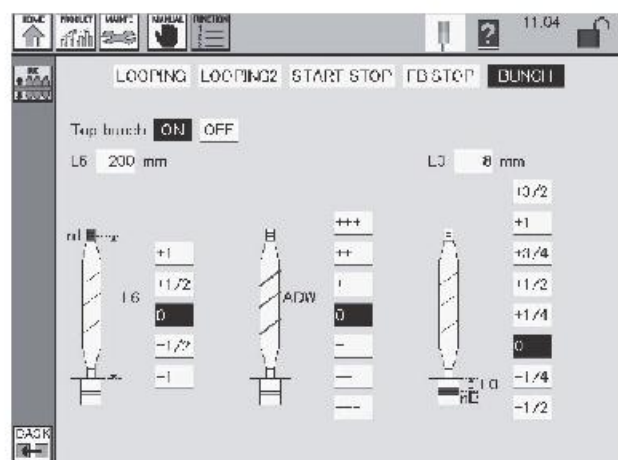
(1) Top bunch position setting

1. To form the top bunch:

- Set top bunch setting to [ON].
- Set the top bunch position (L6).
(Standard: Bobbin length -10 mm)

2. Not to form the top bunch:

- Set top bunch setting to [OFF].
(L6 setting is ignored.)



(2) Adjustment of the number of top bunch windings

Change the set nT value as required.

REFERENCE:

The recommended initial value is 2.5, but it varies slightly with the spinning condition.

(3) Adjustment of the number of advance windings

Change the set ADW as required.

REFERENCE:

If nT is set on the negative side, broken yarn may occur during automatic moving-down depending on the spinning condition.

(4) Adjustment of bottom bunch position

Change the bottom bunch position (L0) as required.

(Standard: -8 mm)

REFERENCE:

A negative value is set as the standard because the position is lower than the zero point of the ring rail. If the bottom bunch is not to be formed, set L0 equal to the 1st moved-up position (L1).

(5) Adjustment of the number of bottom bunch windings

Change the set nB as required.

REFERENCE:

The recommended initial value is 2.0, but it varies slightly with the spinning condition.

[6] Restart Setting after Power Failure Stop

- Set the following at the time of RX restart after power failure stop or emergency stop during RX operation, especially when broken yarn occurs frequently.

Symbol	Name	Unit	Minimum	Maximum	Initial value
RD2	Down-movement of the ring rail at start (after power failure)	mm	0.0	50.0	10.0
tDS2	Draft delayed start (after power failure)	sec	0.0	5.0	0.0
STL4	Power failure stop draft stop timing	—	0	+4	+1
DEC3	Deceleration rate before power failure stop (energy-saving motor specification only)	rpm/s	500	2000	1500



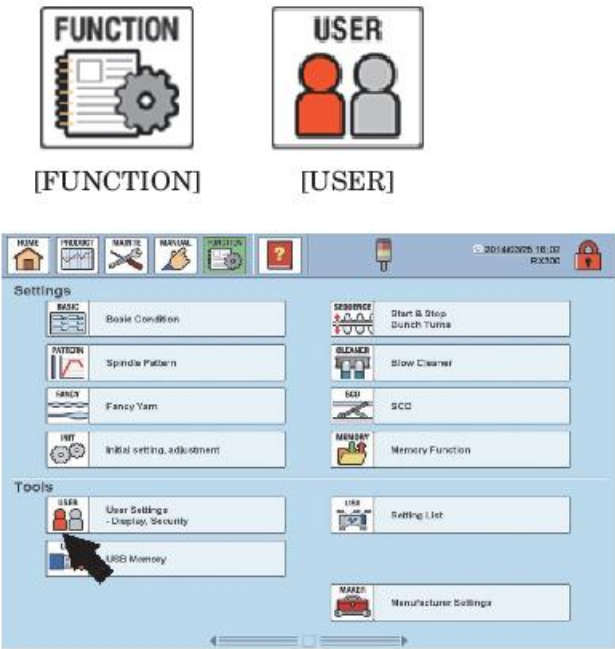
- (1) Restart setting after power failure stop
 1. Down-movement of the ring rail at start (after power failure)
Adjust snarl removal operation due to downmovement of the ring rail.
It is a function similar to snarl removal operation (setting value RD) after normal stop.
 2. Draft delayed start (after power failure)
The draft delayed time at restarting after power failure stop is [tD1 (conventional FR delay time) + tDS2].
- (2) Fine adjustment of power failure stop operation
 1. Power failure stop draft stop timing
This is a function similar to synchronization stop level STL at the time of normal optimum position stop.
 2. Deceleration rate before power failure stop (energy-saving motor specification only)
Reduce the deceleration rate when snarl at the time of power failure stop is especially heavy.

Note: If the setting value is too small, power failure synchronization stop may fail.

7.1A.9 User Setting

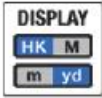
The user setting screen displays the data according to user operation and enables protection in operation to be set.

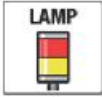
[1] Sub Menu Configuration



Touch the [FUNCTION] icon on the top menu, and touch the [USER] icon on the function menu to display the sub menu on the left-hand side as follows:

Fig. 1 Function menu

- 

Setting the units for yarn count and production length, and the RX name
Touch this icon for settings related to display of home screen, etc.
(Setting screen: See Subsection 7.1A.9 [2].)
- 

Touch this icon to change lighting time setting of the FB prediction lamp. (See Subsection 7.1A.9 [3].)
- 

Touch this icon to set protection from erroneous operation.
(See Subsection 7.1A.9 [4].)
- 

Touch this icon to change the spinning condition password.
(See Subsection 7.1A.9 [5].)
- 

Touch this icon to return to the function menu.

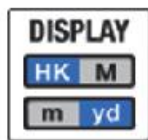


Sub Menu

Fig. 2 Unit setting screen b

[2] Display (DISPLAY)

[2.1] Changing the display units for yarncount, production length, etc.



[DISPLAY]



Fig. 3 Unit setting screen

First, the unit setting screen is displayed. Then, touch the desired icon on the sub menu to change the screen.

NOTE: The selected icon turns orange. Touch the [HOME] icon on the top menu for returning to the home screen.

Touch the [FUNCTION] icon on the top menu, and touch the [USER] icon for user setting on the function menu to display the unit setting screen.

REFERENCE:

- The unit setting screen may be displayed also by touching the [DISPLAY] icon.
- If the [UNIT] switch at the top of the screen is not selected, touch the [UNIT] switch.

Touch the box for the unit to be displayed and change the setting.

The following units can be set:

[Cop Production]

length: HK, M

Yarn count : Ne, Nm, Tex

Twist : TPI, TPM

[Roving]

Grain : gr/30 yd, g/m, Ne, Nm

Length : m, yd

[2.2] RX name setting

The RX name is displayed on the top menu. This name is also used for the file name of the data saved onto the USB memory.



Fig. 4 Display contents setting screen

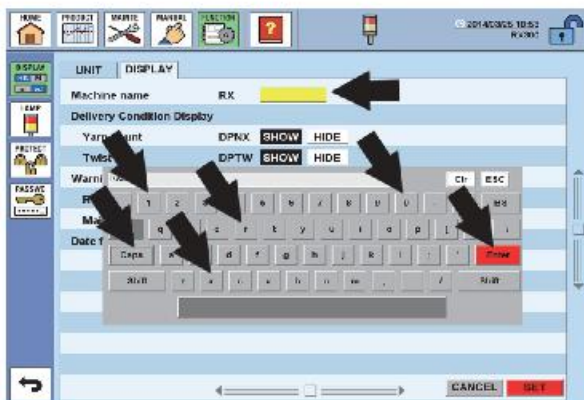


Fig. 5 RX name setting 1

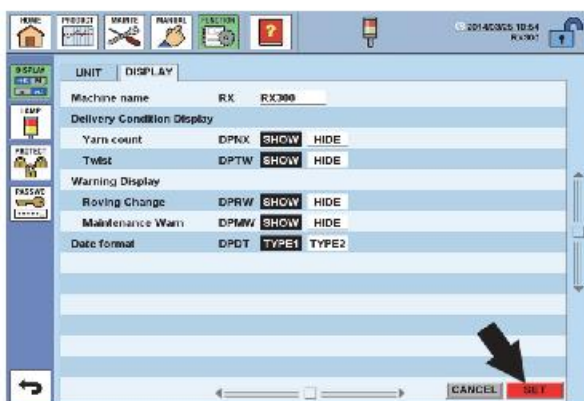


Fig. 6 RX name setting 2

- (1) Touch the [FUNCTION] icon on the top menu, and select the [USER] icon for user setting from the displayed function menu to display the unit setting screen (Fig. 3).

REFERENCE:

The unit setting screen may also be displayed by touching the [DISPLAY] icon.

- (2) Touch the [DISPLAY] switch at the top on the screen to display the unit setting screen
- (3) Set the key switch to the DATA-SET position.

- (4) Touch the RX name setting box to display the keyboard.

- (5) Use the keyboard to input the RX name.

EXAMPLE: To input “RX001”

Touch in the order of
“CapsLock”, “R”, “X”, “0”, “0”,
“1”, and “Enter”.

REFERENCE:

Up to six characters may be set.

NOTE: Unallowable keys (space, tab key, etc.) are disabled.

- (6) Touch the [SET] key at right bottom on the screen “Processed normally” message appears to complete setting.
- (7) Return the key switch to its previous position.

The [CANCEL] and [SET] switches disappear from the screen.

If an “error” occurs, check the contents and repeat setting correctly.

NOTE: Touch the [CANCEL] switch to invalidate the input.

[2.3] Display setting



Fig. 7 Display setting screen

Touching [DISPLAY] at the top of the screen displays the display contents setting screen on which the following display items can be selected.

Spinning Condition Display

Select show or hide for the yarn count and twist count to be displayed on the HOME screen.

Warning Display

Select show or hide for the [Roving Change] icon and [Maintenance Warning] icon to be displayed on the HOME screen.

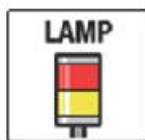
Date Display Format

[TYPE1] : year/month/day

[TYPE2] : day. month. year

[3] Lamp (LAMP)

[3.1] Yellow lamp lighting start time setting



[LAMP]



Fig. 8 Lamp setting screen

Touch the [FUNCTION] icon on the top menu, select the [USER] icon for user setting from the function menu, and touch the [LAMP] icon on the sub menu to display the lamp setting screen. On this screen, set the yellow lamp lighting start timing in terms of the remaining time (minutes) until full bobbin.

Explanation on screen display contents

Full bobbin prediction time tPF: minutes

[4] Protect (PROTECT)

[4.1] Error prevention setting

It is possible to disable partial screen operation unless the key switch is set to the DATA-SET position.



[PROTECT]



Fig. 9 Erroneous operation prevention setting screen

■ Applicable operations

- Counter reset
- Shift counter change operation (in case of total counter)
- Shift counter reset operation
- Half doffing operation
- SCD synchronized/non-synchronized selection
- Operations at [HOME]

Fleece feeding-out auxiliary movement (RX with electronic draft only)

For a change in the spinning condition such as the yarn count or twist multiplier related to the production yarn, it is possible to set protection by the password in addition to that by the key switch.

Touch the [FUNCTION] icon on the top menu, select the [USER] icon for user setting from the function menu, and touch the [PROTECT] icon on the sub menu to display the error prevention setting screen. Set to the [ON] side for operation requiring protection by the key switch.

NOTE: When changing the password protection set for spinning condition changes, input of the current password is necessary.

[5] Password

[5.1] Changing the password for spinning conditions

The initial value of the spinning condition change password is “1414”, but it can be changed using alphanumeric characters (both uppercase and lowercase characters).

NOTE: Keep the password in good memory.



[PASSWD]



Fig. 10 Password change screen



Fig. 11 Password change (input) screen

- (1) Touch the [FUNCTION] icon on the top menu, select the [USER] icon from the function menu, and touch the password change icon on the sub menu to display the password change screen.
- (2) Set the key switch to the DATA-SET position.

- (3) Touch the current password box (white portion), and the keyboard appears. Input the current password. (Each input digit is displayed as *.)
- (4) Similarly, input the new password (alphanumeric characters in uppercase and lowercase characters). (Each input digit is displayed as *.)
- (5) Input the new password again. (Each input digit is displayed as *.)



Fig. 12 Password change screen (Before setting)

(6) After the end of three inputs, touch the [SET] switch.

Processed normally

“Processed normally” appears to complete password change.

Password incorrect

“Password incorrect” appears if the input current password involves an error. Input it again correctly.

7.1A.10 Initial Setting-AdjustmentScreen

[1] Sub Menu Configuration

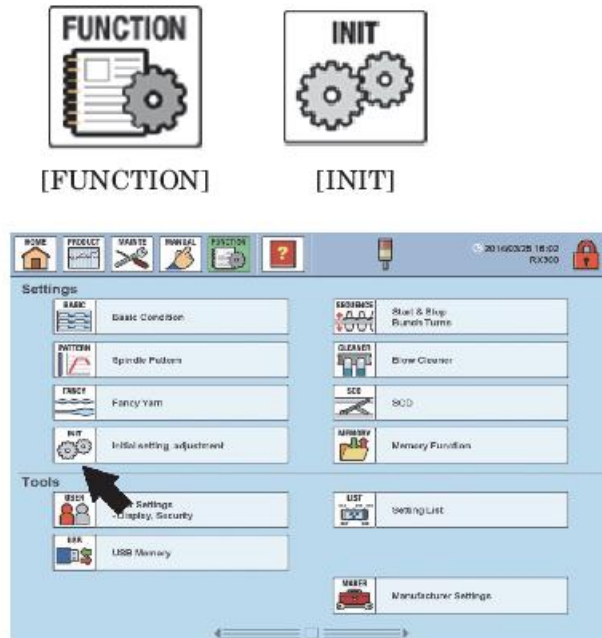


Fig. 1 Function menu screen

- (1) Touch the [FUNCTION] icon on the top menu, and select the [INIT] icon for initial setting-adjustment from the function menu to display the password input screen (Fig. 2).



Fig. 2 Password input screen

- (2) Input password "1414" and touch the [Enter] key to display the initial setting-adjustment screen (Fig. 3).



Fig. 3 Initial setting-adjustment menu screen

Explanation on screen display contents



Touch this icon when setting the machine specifications such as the maximum RX speed, ring diameter and bobbin constants.
(See Subsection 7.1A.10 [2].)



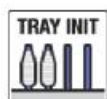
Touch this icon when setting various offset coefficients.
(See Subsection 7.1A.10 [3].)



Touch this icon for ring rail origin setting.
(See Subsection 7.1A.10 [4].)



Touch this icon for SCD doffer position adjustment or timer adjustment (only on RX with SCD).
(See the SCD Instruction Manual.)



Touch this icon when adjusting the SCD tray feeding motion and TBC timer (only on RX with SCD).
(See the SCD Instruction Manual.)



Touch this icon when setting the pneumatic device.
(RX with the energy-saving pneumatic device only)
(Refer to the Instruction Manual of the energy-saving pneumatic device.)



Other setting

[BACK] icon : Touch this switch to return to the function menu. To return to the home screen, touch the [HOME] icon on the top menu.

[2] Machine Specifications Setting



[SPEC]



Fig. 4 Machine specifications setting screen (Basic setting)

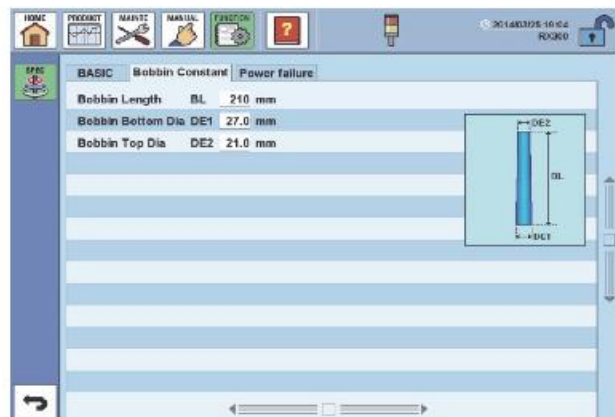


Fig. 5 Machine specifications setting screen (Bobbin constants)

Select the [SPEC] icon (machine specifications) on the initial setting-adjustment screen (Fig. 3) to display the machine specifications setting screen (Fig. 4), and touch the [Bobbin Constant] switch to display the bobbin constants setting screen (Fig. 5).

NOTE: Always set these specifications before trial running. Otherwise, normal RX running will fail.

[2.1] Setting items

Symbol	Name	Unit	Minimum value	Maximum value	Initial value
Rn	Ring name	—	0 character	16 character	0 character
R	Ring diameter	mm	30	60	41
NMAX	Maximum speed	rpm	5000	25000	25000
DDP	Drive pulley				
	Induction motor type →	mm	168	223	193
	Energy-saving motor type →	T	30	60	46
DMP	Motor pulley				
	Induction motor type →	mm	160	213	213
	Energy-saving motor type →	T	30	60	42
DMP	Motor pulley	mm	160	213	213
DDP	Drive pulley	mm	168	223	193
SP	Number of spindles	—	0	1200	1008
SZ	Twist direction (RX with the SZ change function only)	—	Z-twist (initial value)	S-twist	Z twist
DE1	Bobbin diameter (top dia.)	mm	20.0	30	27
DE2	Bobbin diameter (end dia.)	mm	15.0	25	21
BL	Bobbin length	mm	100	255	210
MFG	MFG No.	—	0	999999	0
Sn	Specification No.	—	0 character	16 characters	0 character
Un	User name	—	0 character	16 characters	0 character
PDsw	Continuous operation function for instantaneous power failure	—	Ineffective	Effective	Effective

NOTE: Set the values in compliance with the actual RX specifications.

[3] Setting Various Offset Coefficients



[SPINDLE]



Touch the [SPINDLE] icon (various offsets) on the initial setting-adjustment menu screen (Fig. 3) to open the various offset coefficients setting screen.

Fig. 6 Various offset coefficients setting screen

[3.1] Setting items

Symbol	Name	Unit	Minimum value	Maximum value	Initial value
SRC	Spindle slip offset	%	-5.0	+5.0	0.0
SMC	Spindle measuring offset	%	-5.0	+5.0	0.0

[3.2] Offset description

- SRC
Standard for correcting the difference between the instructed spindle rpm and actual rpm (slip offset)
Make adjustment by comparing the instructed rpm and actual rpm.
- SMC
Correction for the difference between the actual spindle rpm and the rpm calculated from the measured pulses (PRS5)
Make adjustment by comparing the rpm display on the sub monitor and the actual rpm.

[4] Ring Rail Origin Adjustment

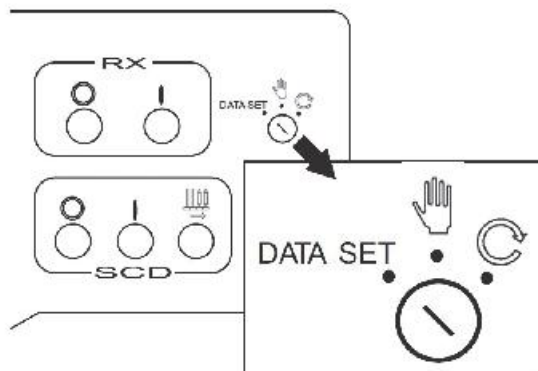
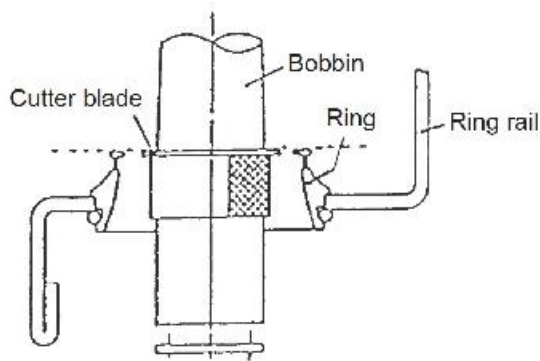
⚠ CAUTION

Note that the ring rail automatically moves up and down for teaching when ring rail origin is adjusted.

REFERENCE:

Adjust the ring rail origin only once after installation. Normally, do not adjust it thereafter.

- (1) Use the handle and move the ring rail position until the cutter blade upper face is aligned with the ring upper face.



- (2) Set the key switch on the OE operation panel to the DATA-SET position.
- (3) Touch the [FUNCTION] icon on the top menu to display the function menu, and select the [INIT] icon to open the password input screen.



[RAIL INIT]

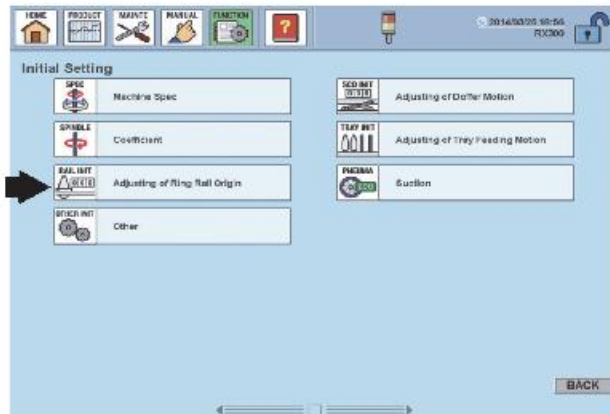


Fig. 7 Initial setting-adjustment menu

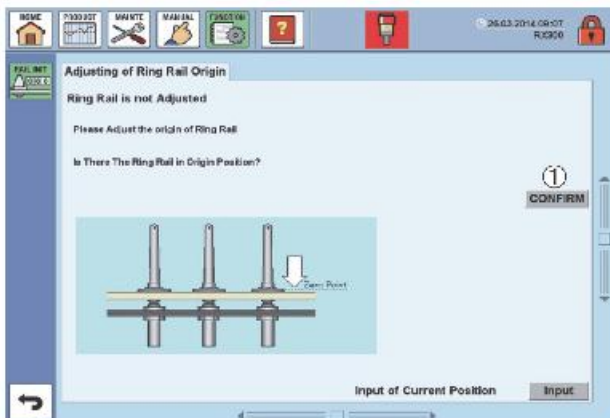


Fig. 8 Ring rail origin setting (Incomplete)

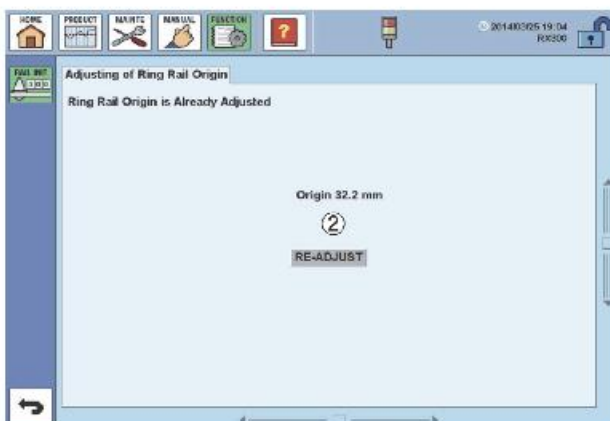


Fig. 9 Ring rail origin setting (Complete)

(4) Input “1414” as the password and touch the [Enter] key to display the initial setting-adjustment menu.

(5) Touch the ring rail origin adjusting icon on the initial setting-adjustment menu (Fig. 8) to display the ring rail origin setting screen.

1. When setting is incomplete, the screen display is as shown in Fig. 8. (Warning message W-16C is displayed.)
2. When setting is complete, the screen display is as shown in Fig. 9.
3. For resetting after setting completion, touch the [RE-ADJUST] switch ② in Fig. 9.

As the reconfirmation screen appears, touch [YES] if OK. this returns to the setting incomplete state and the screen in Fig. 8 reappears.

(6) Make sure that the ring rail is in the specified position, and check adjustment of the PRS8 sensor and bracket. Touch [CONFIRM] (① in Fig. 8).

NOTE: Use the specified handle for rail movement.

7.1A.10 Initial Setting-AdjustmentScreen



Fig. 10 Origin teaching start screen



Fig. 11 Teaching in progress screen



Fig. 12 Normal end screen

- (7) Perform teaching operation for origin adjustment.

After checking safety without any obstacle, touch the [START] switch.

The ring rail returns to the origin after moving upward by about 100 mm.

NOTE: The message shown in Fig. 11 appears during teaching, so do not touch the screen.

REFERENCE:

Teaching means to let the position where the ring rail offset sensor (PRS8) turns from ON to OFF be memorized while the ring rail moves down by 100 mm.

With this position as the origin, the ring rail position is adjusted each time PRS8 turns from On to OFF during FB lowering for doffing.

- (8) “Adjusting OK” message appears upon normal end of teaching.

Touch the [CONFIRM] switch to display the ring rail origin adjusting screen (Fig. 9).

NOTE: If adjustment is abnormal, Fig. 13 or trouble window appears. Make readjustment accordingly.

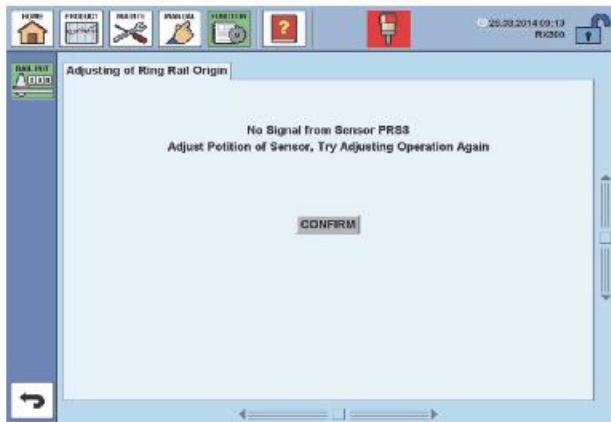


Fig. 13 Abnormal end screen

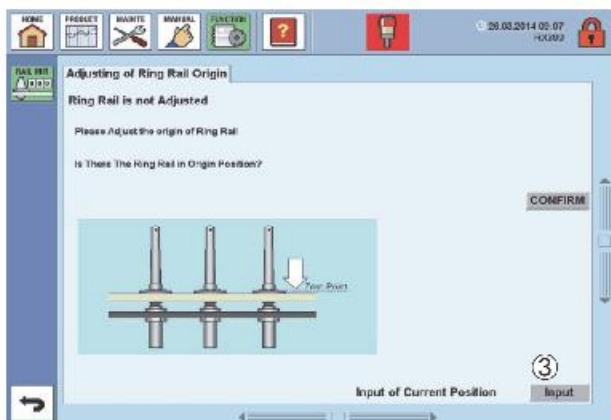


Fig. 14 Ring rail origin adjustment screen (incomplete)

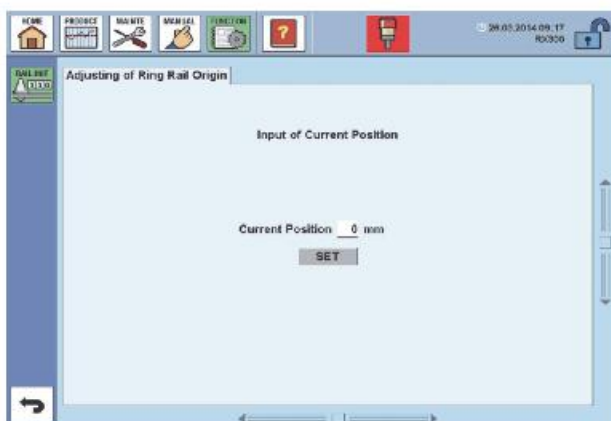


Fig. 15 Ring rail origin adjustment screen (current position input)

- (9) Return the key switch to the  position.
Extract and keep the key.

※When it is difficult to move the ring rail to the origin because of spinning stop, etc., you can input the current ring rail position directly.

In this case, the teaching operation is not carried out, and origin (PRS8) adjustment is made when the full bobbin is automatically lowered the next time.

NOTE: With this operation, you cannot make accurate origin adjustment. When there is no problem with the spinning,

1. Touch the [INPUT] switch (③) for inputting the current position.
2. Input the current position.

NOTE: Because the machine may be damaged, enter an accurate value for the current position.

3. When you touch the [DETERMINE] switch, a confirmation screen appears. When the information on the confirmation screen is OK, touch [YES]. The setting has been complete and the screen in Fig. 9 appears.

7.1A.11 USB Memory Use Method

In the function panel, you can do the following by using the USB memory.

- Saving/downloading of data such as setting values of the RX onto/from the USB memory
- Simple reference of files in the USB memory
- Saving/editing of display screen images onto/in the USB memory

NOTE: During access to the USB memory, do not remove the USB memory.
(Otherwise, the USB memory may get broken.)

[1] Explanation on each icon

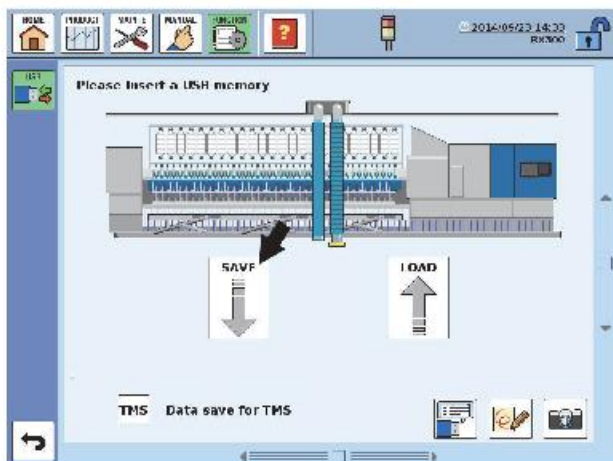


Fig. 1 USB memory screen

	Saves the set data of the RX onto the USB memory
	Downloads the set data of the RX from the USB memory
	Refers to files in the USB memory
	Edits image files in the USB memory
	Saves screen capture images onto the USB memory

[2] Saving the RX Data onto the USBmemory

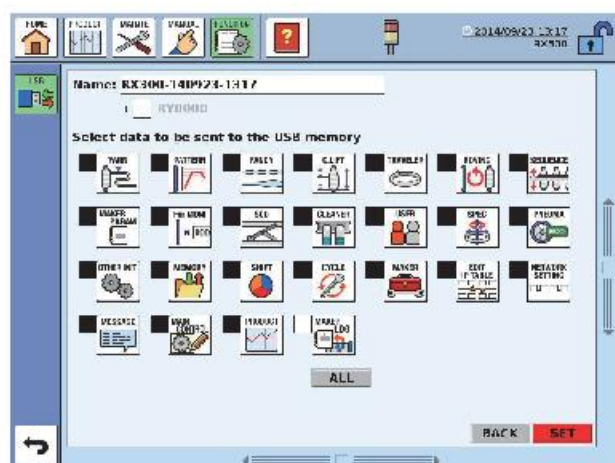
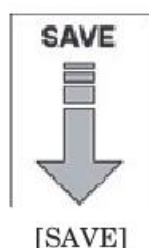


Fig. 2 Sending data selection screen

- (1) Insert the USB memory into the specified slot.
- (2) Touch [SAVE] on the USB memory screen (Fig. 1). The sending data selection screen appears.
- (3) On this screen, select the data to be saved onto the USB memory.

The data groups, checked in the check boxes on the left side of respective icons, are saved onto the USB memory. Touch each icon for toggling the check mark on and off.

Touch the [ALL] switch for toggling all icon check marks (excluding the [MAKER LOG] icon).



※ [MAKER LOG] icon

In normal operations, it is unnecessary to turn ON the check mark of this icon. (For a machine trouble examination, etc., it may be necessary to turn ON the check mark and to store the examination result in the USB memory.)

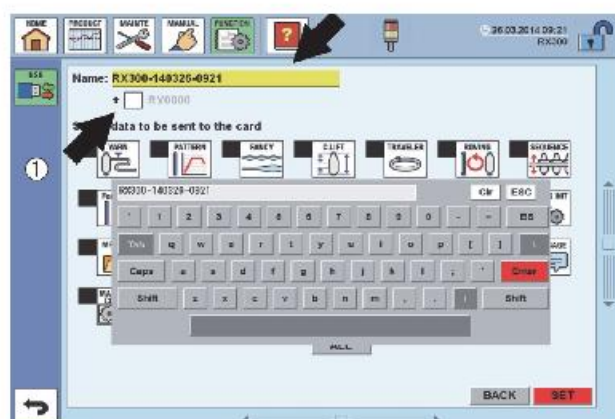


Fig. 3 File Name setting screen

- (4) The standard file name format is "RX name" - "date" - "time". To change a file name, touch the name box and input the desired file name on the keyboard that appears.

* When a user name and a specification number have been set, changing the checkbox (①) to ■ will add [User name-Specification number] to the file name.

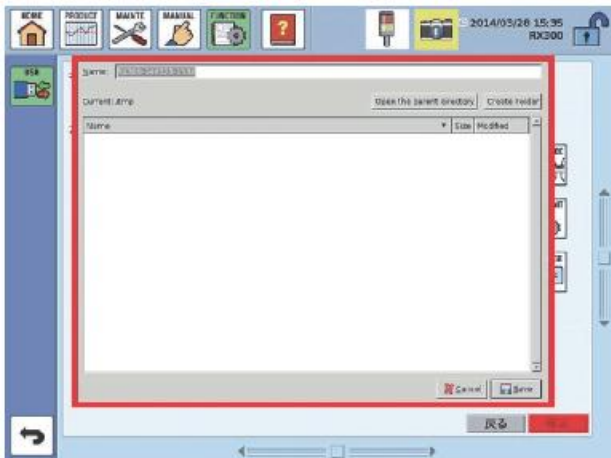
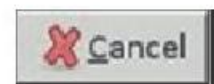


Fig. 4 Select a file dialog



[Save] button



[Cancel] button



Fig. 5 Overwrite check warning window



- (5) When the data and file name to be saved onto the USB memory are determined, touch the [SET] switch. The Select a File dialog (Fig. 4) pops up.

REFERENCE:

If the USB memory cannot be recognized due to insertion failure, for example, the USB memory non-insertion warning window appears. Make sure that the USB memory is inserted.

- (6) Confirm the file name and touch the [SAVE] button in the Select a File dialog to save the data onto the USB memory.

REFERENCE:

The Select a File dialog disappears if no abnormality exists.

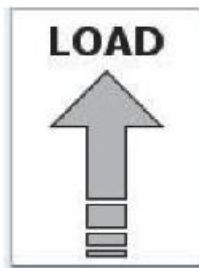
REFERENCE:

If the input file name already exists, the overwrite check warning window (Fig. 5) appears. Touch [SAVE] for overwriting. If overwriting is not desired, touch the [Cancel] button, touch the [Cancel] button on the Select a File dialog (Fig. 4), and touch the [BACK] switch on the sending data selection screen (Fig. 2) to repeat from step (2).

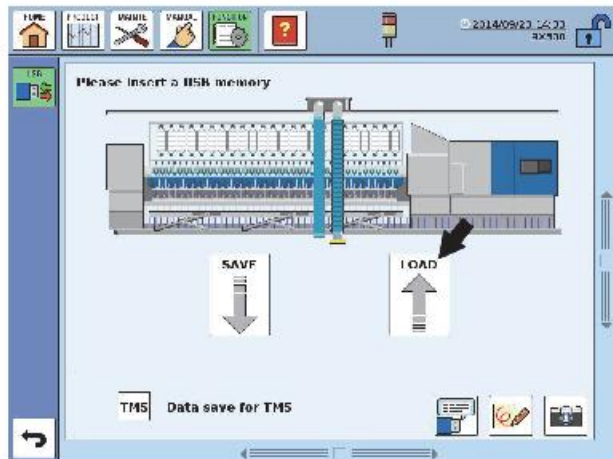
- (7) When saving onto the USB memory ends, the sending data selection screen appears. Touch the [BACK] switch to return to the USB memory screen (Fig. 1).

NOTE: Do not remove the USB memory while the [Don't remove USB memory] window is displayed in the central part of the screen

[3] Data Uploading from USB memory



[LOAD]



- (1) Insert the USB memory into the specified slot.
- (2) Touch [LOAD] on the USB memory screen to display the select upload file screen (Fig. 6).

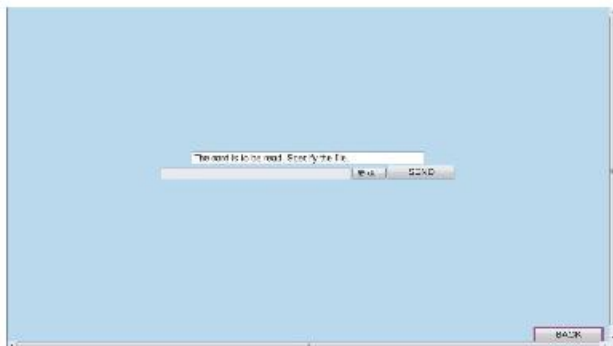


Fig. 6 Select upload file window

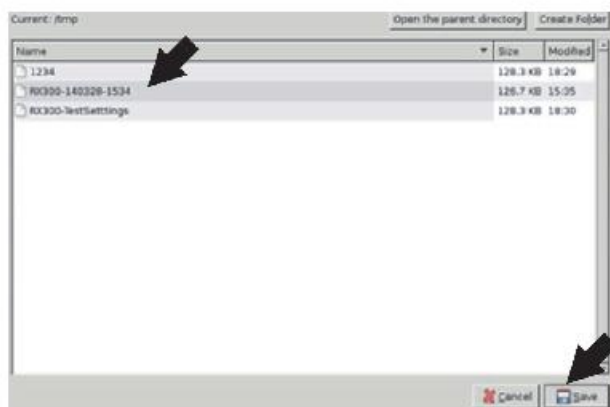


Fig.7 Select upload file window

- (3) Touch the [CHECK] on the file selection screen, and the [Select Upload File] window (Fig. 7) pops up.

- (4) Touch the uploading file name in the file name display area in this window and confirm that the selected file name appears in the File Name box.

REFERENCE:

If the response is late, touch the file name again.

- (5) After file selection, touch the [Open] button in the [Select Upload File] window to display the selected file name on the file selection screen (Fig. 6).



- (6) Touch the [SEND] switch on the select upload file window to display the upload data selection screen (Fig. 8).

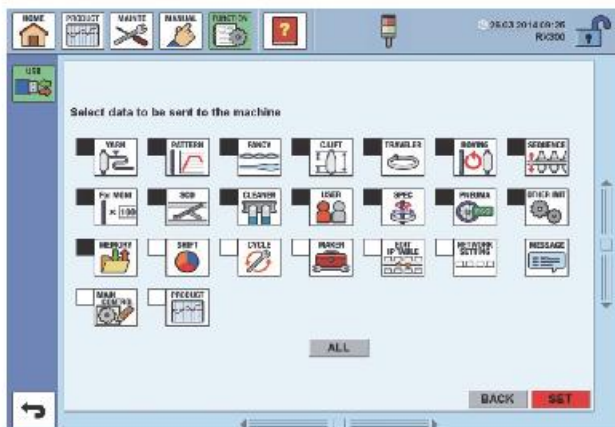


Fig.8 Upload data selection screen

- (7) Select the groups of data to be uploaded to the RX. Those groups with check marks on the left side of their icons are uploaded to the RX.
Touch each icon for check mark toggling between ON and OFF.
Touch the [ALL] switch for toggling all icon check marks (excluding the [MAKER] icon).
- (8) After determining the data groups to be uploaded, touch the [SET] switch.

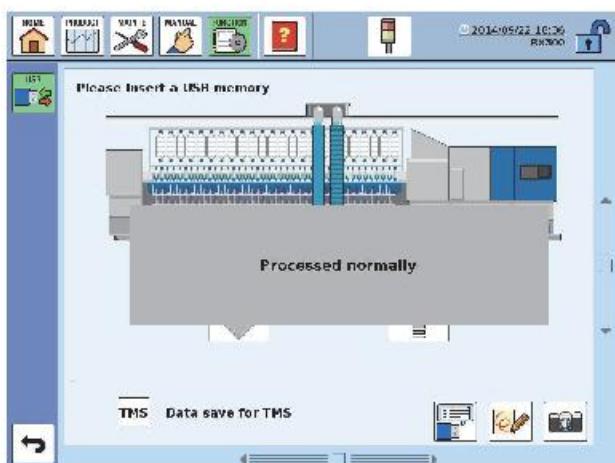


Fig.9 Normal end display

- (9) “Processed normally” message appears when all data are uploaded normally, and the USB memory screen (Fig. 1) reappears.

REFERENCE:

If any abnormality exists in data uploading, the icon of the group failed in uploading appears. After checking no abnormality in the RX, retry uploading.

[4] Referring to Files in USB Memory



[USB MEMORY]

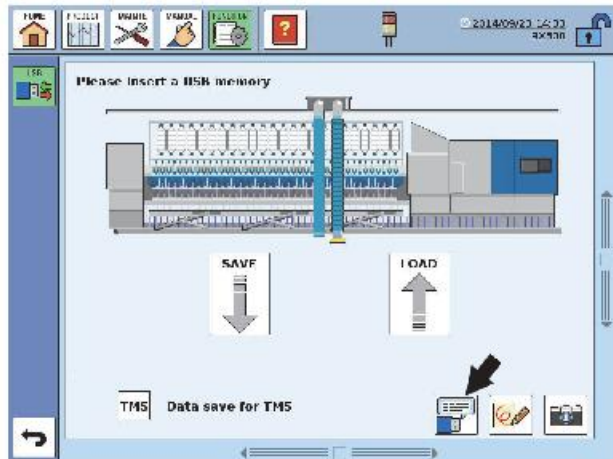


Fig. 10 Referring to files in USB memory

The following files in the USB memory can be referred to on the function panel.

NOTE: Only those whose names consist of alphanumeric characters.

- EXCEL file (.xls)
- PDF file (.pdf)
- Movie file (.mpeg)

In addition, some text files and image files can be also referred to.

In this case, use the F2 key to display the home screen.

Touch the [FILE SELECTION IN USB MEMORY] icon after inserting the USB memory into the specified slot. The file selection window appears.

Here, select the file to be referred to. (Fig. 10)

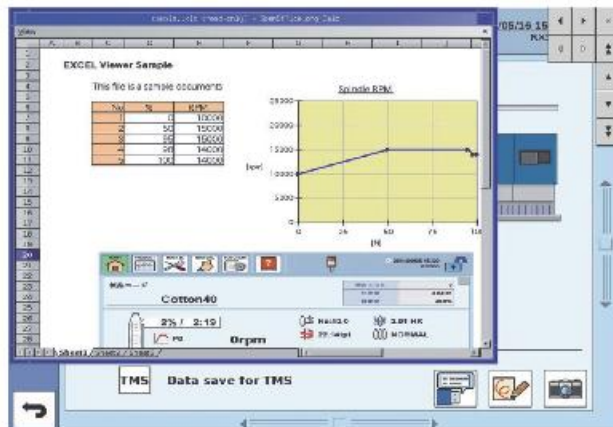


Fig. 11 EXCEL Viewer1

(1) Referring to an EXCEL file (.xls)

Refer to an EXCEL file by using the EXCEL Viewer.

NOTE: Do not remove the USB memory while referring to the file.

- The file cannot be edited.
- When a file (.xls) to be referred to is selected, the viewer is started automatically.
- It takes time to display a file of a large size.
- You can also operate with the dedicated button displayed at the upper right of the screen at the same time.
- Touch the [X] button at the upper right of the screen to exit.

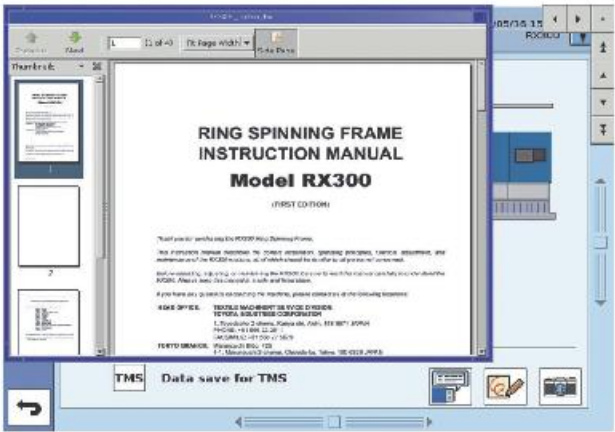
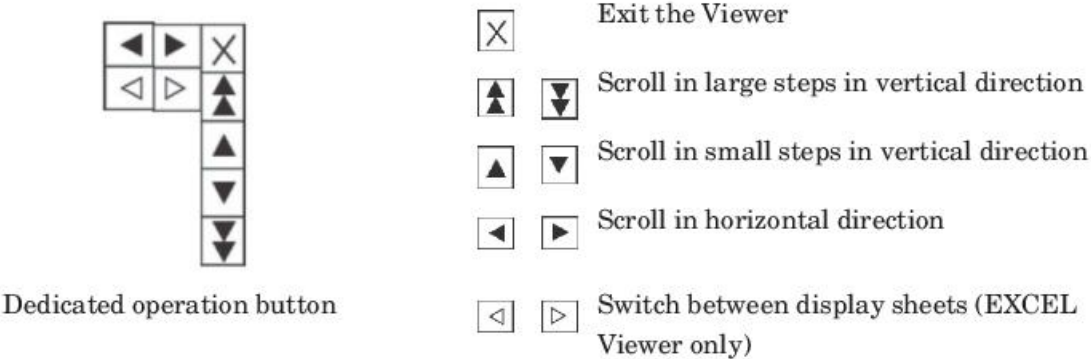


Fig. 12 PDF Viewer

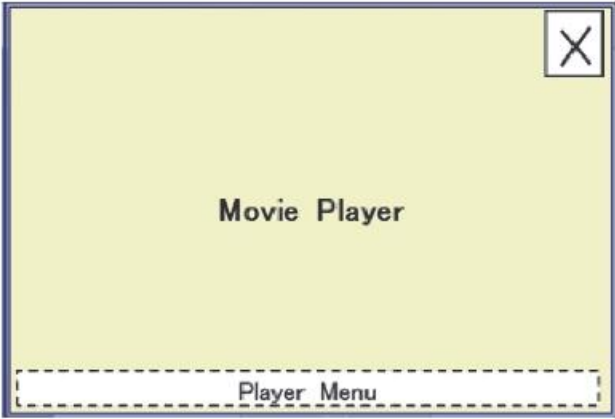


Fig. 13 Movie Player

- (2) Referring to a PDF file (.pdf)
- Refer to a PDF file by using the PDF Viewer.
- NOTE:** Do not remove the USB memory while referring to the file.
- When a file (.pdf) to be referred to is selected, the viewer is started automatically.
 - It takes time to display a file of a large size.
 - You can also operate with the dedicated button displayed at the upper right of the screen at the same time. (Refer to the EXCEL Viewer in (1))
 - Touch the [X] button at the upper right of the screen to exit.

- (3) Referring to a movie file (.mpeg)
- Play a movie by using the Movie Player.
- NOTE:** Do not remove the USB memory while referring to the file.
- When a movie file (.mpeg) to be referred to is selected, the player is automatically started to play the movie. (Full screen mode)
 - It takes time to display a file of a large size.
 - The movie may not be played normally depending on the file format.
 - Touch the [X] button at the upper right of the screen to terminate playing of the movie.

REFERENCE:

When you touch the central part of the screen while the movie is played, a menu for the player appears temporarily. Operations such as "Play," "Stop," "Fast-forward," and "Window mode

switching" are available.

[5] Screen Capture and Editing

USB memory as an image file in JPG format.

NOTE:

Operate with the USB memory inserted into the specified slot.

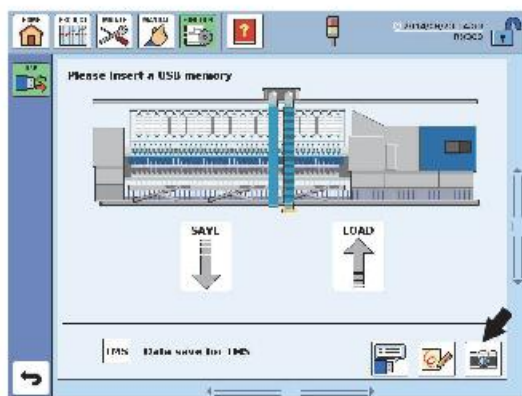
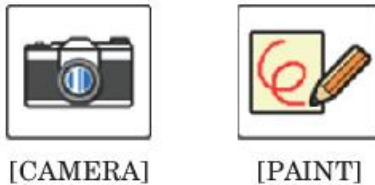


Fig. 14 Screen capture (USB memory screen)

- (1) Touch the [CAMERA] icon. (Fig. 14)
- (2) The [CAMERA] icon appears on the top menu. (Fig. 15)
- (3) Display a screen to be captured.
(Move with normal screen operation)
- (4) Touch the [CAMERA] icon displayed on the top menu.

The image is captured and saved in the USB memory.

NOTE: The name of the file to save the image is as follows.

- RX300-140329-1054-1.jpg
- "RX name"-"Date (yymmdd)"-"Time (hhmm)"-"No." .jpg

- (5) Next, the [PAINT] tool is started automatically to open the captured image.

NOTE: Edit the captured image if you want to add some comments to it.

- (6) Touch the [X] button at the upper right of the screen to exit.

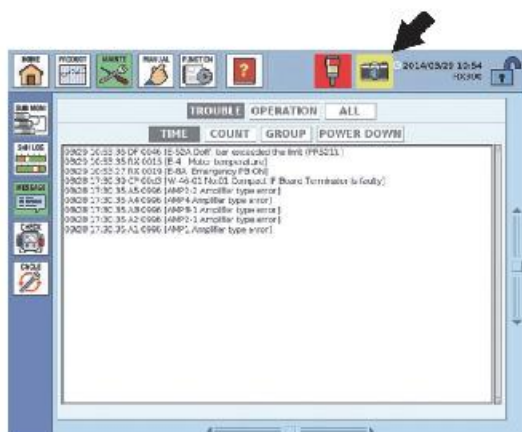


Fig. 15 [CAMERA] icon displayed on top menu

7.1A.12 Other Setting-OperationExamples

[1] Setting List

The RX setting values are displayed as a list to check no input errors.



[FUNCTION]



[LIST]

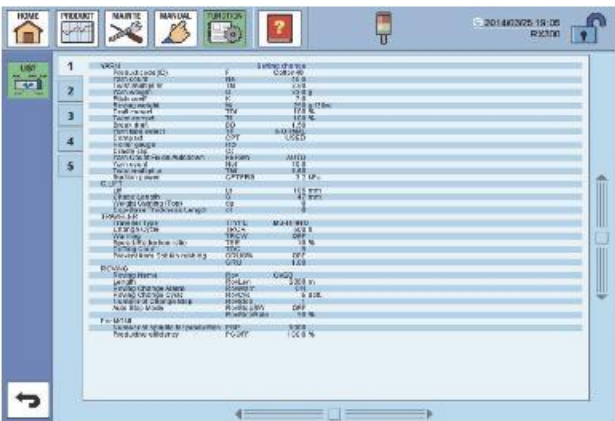


Fig. 1 Setting list (Page 1)



Fig. 2 Setting list (Page 4)

(1) Touch the [FUNCTION] icon on the top menu, and select the [LIST] icon (setting list) from the tools on the function list to display the setting list screen.

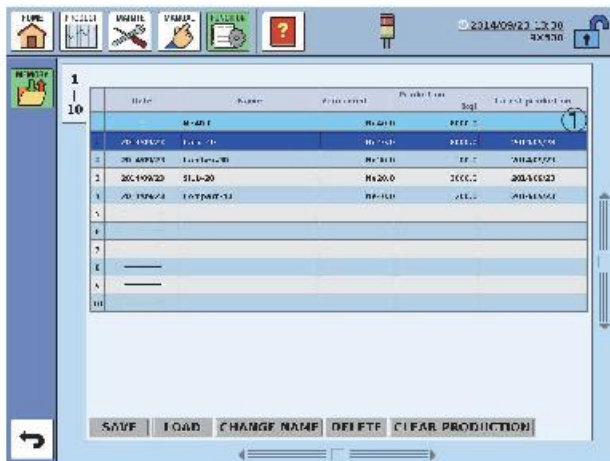
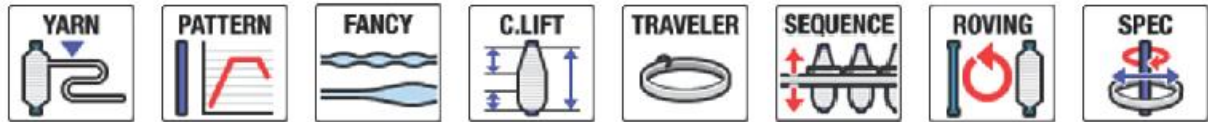
(2) The setting list screen consists of four pages. Explanation on screen display items
Each item is displayed in the order of group, name, symbol, and value.
• Touch [1], [2], [3], or [4] icon for direct display of the corresponding page.

[2] Memory Function

The memory function saves the current RX setting values temporarily for reuse on a later opportunity.

Up to 10 setting value groups may be saved.

<Memory information>

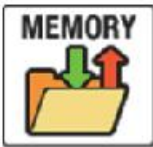


The following items are automatically memorized.

- Date: Saved date
- Name: Any name can be input.
- Yarn count: Average yarn count
- Production past results (kg): Production in view of the number of spindles
- Last production date

※The top row ((1)) displays the current condition. For spinning under the condition loaded from the memory, the memory number (1-10) is displayed in the date frame. (The loaded memory is changed to navy-colored.)

[2.1] Memory function screen



[MEMORY]



Fig. 3 Memory function screen

- (1) Touch the [FUNCTION] icon on the top menu, and select the [MEMORY] icon (memory function) from the tools on the function menu to display the memory function screen.

[2.2] Saving the current RX data

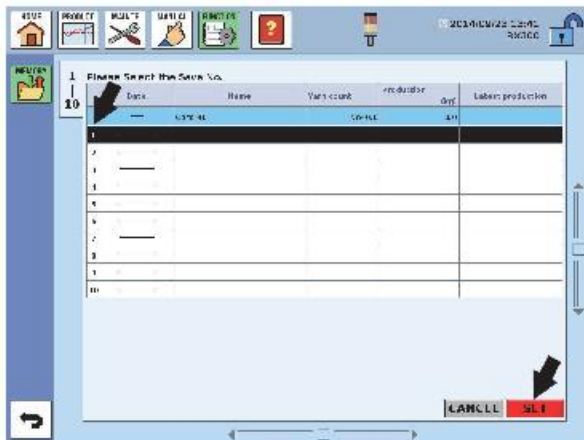


Fig. 4 Saving destination selection screen



Fig. 5 Name setting screen



Fig. 6 Saving completion screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the [SAVE] switch on the memory function screen (Fig. 3) to display the saving destination selection screen. Select the box of the desired No. here (to turn it black) and touch the [SET] switch.

- (3) The name setting screen appears. If the product code or name is not set, the set yarn count is automatically set as the name. To change it, touch the name box to display the keyboard for setting as desired.

- (4) Touch the [SET] switch after setting the name to complete saving. The name and saving date are displayed at the saving destination No. on the memory function screen (Fig. 3).

REFERENCE:

Overwriting confirmation screen appears if overwriting may be necessary.

- (5) Return the key switch to its previous position.

[2.3] Uploading the saved data to the RX



Fig. 7 Memory function screen

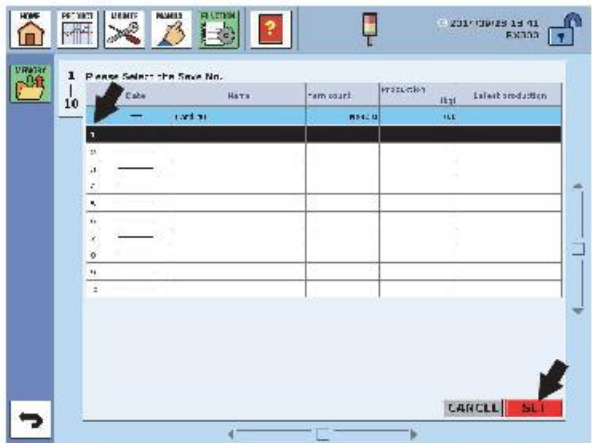


Fig. 8 Loading source selection screen

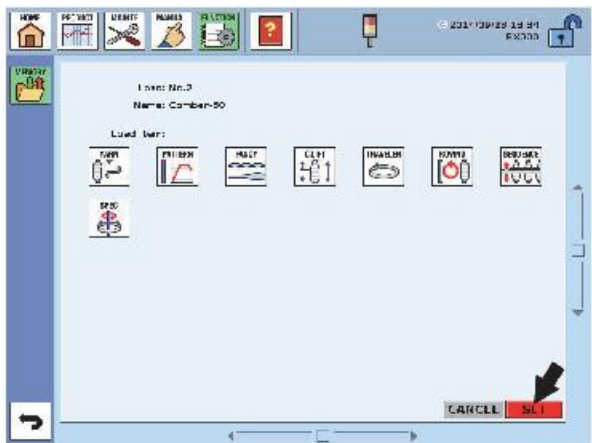


Fig. 9 Loading data selection screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the [LOAD] switch on the memory function screen to display the loading source selection screen (Fig. 8).

Touch the box of the desired No. (to turn it black) and touch the [SET] switch.

- (3) The loading data selection screen appears. (All setting values of the icon group saved are loaded.)
- (4) Touch the [SET] button to display the password input screen. Input the set spinning condition password, touch [ENTER] to complete loading to the RX.
- (5) Return the key switch to its previous position.

[2.4] Changing the name of saved data



Fig. 10 Memory function screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the [CHANGE NAME] switch on the memory function screen to display the name change selection screen (Fig. 11)



Fig. 11 Name change selection screen

Touch the box of the No. desired for name change, and touch the [SET] switch.



Fig. 12 Name change screen

- (3) Since the keyboard for name change appears, input the desired name, and touch the [Enter] key.



Fig. 13 Name change screen (after entry)

- (4) Confirm correct name change, and touch the [SET] switch to complete the name change.
- (5) Return the key switch to its previous position.

[2.5] Deleting the saved data



Fig. 14 Memory function screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch the [DELETE] switch on the memory function screen to display the deleting data selection screen (Fig. 15).



Fig. 15 Deleting data selection screen

Touch the box for the No. desired to be deleted (to turn it black) and touch the [SET] switch.

- (3) The deletion confirmation screen appears. Touch [Yes] to complete the deletion.
- (4) Return the key switch to its previous position.

[2.6] Clearing the production past results to zero



Fig.16 Memory function screen

- (1) Set the key switch to the DATA-SET position
- (2) Touch the [Clear Production] button on the memory function screen to display the production clear selection screen.



Fig.17 Production clear selection screen

- (3) Touch the box of the desired No. for production zero clear (to turn it black) and touch the [SET] button.
- (4) The production clear confirmation screen appears. Touch [YES] to set 0 kg to the production past results of the selected memory No.
- (5) Finally, return the key switch to its previous position.

[3] Changing Backlight Off Time

The initial value of the backlight automatic off time of the function panel is set to 10 min., however, change it on "Others" setting screen in the initial setting/adjustment menu of the function menu.

Symbol	Name	Unit	Minimum	Maximum	Initial value
tFBL	Backlight off time	min	1	60	10

[4] Changing Date Display Format

The format of the date displayed on the function panel can be selected from the following two types. Change with "Date display format (symbol: DPDT)" in the "Display" screen of the user setting.

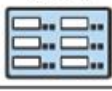
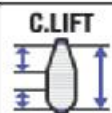
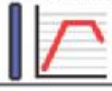
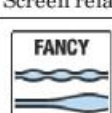
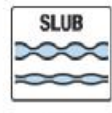
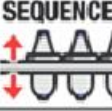
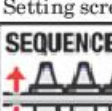
[TYPE1] year/month/day

[TYPE2] day. month. year

※The display format of information in the production information log and memory function that was recorded in the past cannot be changed.

7.1A.13 Screen Hierarchy List

Top menu	Sub menu	Screen description	Related section
Home			
HOME 	Home screen Monitors RX conditions and production status. Registers the operation start/end time for traveler change, roving change and maintenance. Switches to traveler running-in operation.		7.1A.2 [2.6]
Production information			
PRODUCT 	REPORT 	Report screen Displays the production information for the past one week. Displays the efficiency trend graph.	7.1A.3 [2]
	COUNTER 	Counter screen Displays the total production length by shift. Manual shift selection	7.1A.3 [3]
	P.LOG 	Production log screen Displays the log of past 30 production records by spinning condition.	7.1A.3 [4]
	SHIFT 	Shift schedule setting screen Sets the automatic shift change time.	7.1A.3 [5]
	CLOCK 	Time setting screen Used for setting the current clock time.	7.1A.3 [6]
Maintenance information			
MAINT 	SUB MONI 	Sub monitor screen Displays the rough current shaft rpm and other measurement values of the RX	7.1A.4 [2]
	24H LOG 	24-hour RX information screen Displays the RX running status for past 24 hours as a trend graph.	7.1A.4 [3]
	MESSAGE 	Message history screen Displays the log of past 100 trouble messages. Displays the log of past 100 running records.	7.1A.4 [4]
	CHECK 	Check screen Displays the basic information on each spindle. Displays input-output information (I-O monitor).	7.1A.4 [5]
	CYCLE 	Maintenance cycle setting screen Sets the cycle of warning display for maintenance purpose.	7.1A.4 [6]
Manual operation			
MANUAL 	Manual operation screen Manual operation of each device. Setting of counter reset, half doffing, and SCD synchronization. Settings for optimum position stop reservation.		7.1A.5

Top menu	Menu screen	Sub menu	Screen description	Related section	
Function/setting					
	FUNCTION Various function and setting menu screen Basic settings of spinning conditions and spindle patterns. User settings, RX adjustment, device setting and other detailed settings. Setting tools such as the setting list, USB memory and memory function can be used.				
	Spinning conditions				
		BASIC Screen for basic settings related to spinning			
			YARN - Setting basic spinning yarn conditions such as yarn count, twist multiplier, and roving grain. - Setting of spinning yarn during full-bobbin downward movement. - Reference to various values calculated from settings.	7.1A.6 [2]	
			C.LIFT Setting of chase length and lift related to bobbin yarn shape.	7.1A.6 [3]	
			TRAVELER Detailed setting related to traveler running-in operation.	7.1A.7 [5]	
			ROVING Settings related to roving.	7.1A.6 [4]	
			For MONI Settings related to production spindles and efficiency.	7.1A.6 [5]	
		PATTERN Setting screen related to spindle speed shift pattern.			
			PATTERN - Simple and detailed settings of speed shift patterns (up to 10 patterns) - Select the running pattern, and set programmed operation.	7.1A.7	
		Screen relating to fancy yarn spinning pattern			
			FANCY - Display of set fancy yarn spinning pattern information - Display of step contents of multi-pattern and slub-pattern yarns	Fancy Yarn instruction manual	
			MULTI		
			SLUB		
RX operating conditions					
	SEQUENCE Setting screens related to startup and stopping of RX				
		SEQUENCE - Timing adjustment for heaving, optimum position stop, restarting and full bobbin stop - Bunch winding adjustment	7.1A.8		

7.1A.13 Screen Hierarchy List

Top menu	Menu screen	Sub menu	Screen description	Related section
	User setting			
		Customize setting screens according to user applications		
			Setting of HOME screen display contents	7.1A.9 [2]
			Display units and FB advance notice timing	7.1A.9 [3]
			Setting of key lock and spinning condition password lock for protection of partial screen operation	7.1A.9 [4]
			Password change	7.1A.9 [5]
	Initial setting and adjustment			
		RX initial setting and adjustment		
	Menu screen (2)	Sub menu	Setting RX specific values such as maximum spindle speed, ring diameter and bobbin constants	7.1A.10 [2]
			Setting various offset coefficients	7.1A.10 [3]
				
			Ring rail origin adjustment	7.1A.10 [4]
			SCD doffer origin adjustment	SCD Instruction manual
			SCD tray feeding motion and TBC timer adjustment	SCD Instruction manual
				
				

Top menu	Menu screen	Sub menu	Screen description	Related section
		 	Energy-saving pneumatic device setting	Energy-saving Pneumatic Device Instruction Manual
			Other setting	
	Device setting			
		 	Setting of operating conditions related to SCD - Setting of conditions such as SCD activation timing - SYC operation setting	SCD Instruction manual
			Setting screen related to blow cleaner and fly collector - Setting of blow cleaner intermittent operation and full bobbin escape time - Setting of pneumatic stop time during fly collection	
	Tools			
			USB memory screen - Saving RX settings, production information and maintenance information to USB memory and loading them from USB memory - Saving data for TMS onto USB memory	7.1A.12
			Memory function screen Temporary saving of current operation settings (up to 5 sets) onto USB memory and loading them from USB memory	7.1A.12 [2]
			Setting list screen - Setting value list display - Setting value comparison with other machines and remote copying	7.1A.12 [1] See the TMS Instruction Manual.
			Other RX information screen (* in case of network specification only) List display of status, production bobbin percentage and time until full bobbin of registered other machines	See the TMS Instruction Manual.
			Screen dedicated to Toyota - Display language selection - Program backup and installation - Machine specification backup and installation	

7.1A.14 Setting Value List

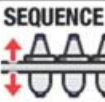
The function screen menus and setting values are listed here.

[1] Spinning Conditions

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
		Basic	F	Product code	Max 10 alphanumeric characters				×
		Basic	Nx (Ne)	Yarn count (Ne)	Ne	1.0	300.0	40.0	×
		Basic	Nx (Nm)	Yarn count (Nm)	Nm	3.0	510.0	67.7	×
		Basic	Nx (Tex)	Yarn count (Tex)	Tex	2.0	295.2	14.8	×
		Basic	TM	Twist multiplier (British type)	—	1.50	10.00	3.50	×
		Basic	TMm	Twist multiplier (metric type)	—	45.4	302.5	105.0	×
		Basic	TMt	Twist multiplier (tex type)	—	1435	9561	3346	×
		Basic	G	Yarn weight	g	10.0	200.0	33.0	×
		Basic	K	Yarn pitch coefficient	—	0.5	30.0	7.0	×
		Basic	W (gr/30 yd)	Roving grain (gr/30 yd)	gr/30 yd	20	999	250	×
		Basic	W (g/m)	Roving grain (g/m)	g/m	0.05	2.35	0.59	×
		Basic	W (Ne)	Roving grain (Ne)	Ne	0.25	12.50	1.0	×
		Basic	W (Nm)	Roving grain (Nm)	Nm	0.42	21.16	1.69	×
		Basic	TDF	Draft offset correction	%	50	150	100	
		Basic	TF	Twist count correction	%	50	150	100	
		Basic	BD	Break draft	—	1.00	2.3*	1.50	×
		Basic	YP	Yarn product selection	—	Normal	Slub*	Slub*	
		Basic	CPT	Compact	—	Use	Non-use	Use	×
		Basic	RG	Roller gauge	Max. 8 alphanumeric characters				×
		Basic	CC	Cradle clip	Max. 8 alphanumeric characters				×
		Full bobbin fixed	FBFSW	Full bobbin fixed switch (invalid, valid)	—	OFF/Manual/Auto/Auto			×
		Full bobbin fixed	Nxf(Ne)	Yarn count (Ne) at full bobbin auto down	Ne	2.0	300.0	40.0	×
		Full bobbin fixed	Nxf(Nm)	Yarn count (Nm) at full bobbin auto down	Nm	3.0	510.0	67.7	×
		Full bobbin fixed	Nxf(Tex)	Yarn count (Tex) at full bobbin auto down	Tex	2.0	295.2	14.8	×
		Full bobbin fixed	TMf	Twist multiplier (British) at full bobbin auto down	—	1.50	10.00	3.50	×
		Full bobbin fixed	TMmf	Twist multiplier (metric) at full bobbin auto down	—	45.4	302.5	105.0	×
		Full bobbin fixed	TMtf	Twist multiplier (Tex) at full bobbin auto down	—	1435	9561	3346	×
		Compact	CPTLVL	Compact suction pressure	—	1	4	1	×

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
	C.LIFT	Lift	Lt	Total lift	mm	100	255	185*	×
		Lift	C	Chase length	mm	30	75	47	×
		Lift	du	Upper depressing	—	0	+6	0	×
		Lift	dl	Increased winding	—	0	+6	0	×
		Traveler	TTYPE	Traveler name	Max. 10 alphanumeric characters				×
		Traveler	TRCH	Replacement cycle	h	1	5000	500	×
		Traveler	TRCW	Replacement warning	—	Valid	Invalid	Invalid	×
		Traveler	TSR	Spindle speed deceleration rate	%	0	20	10	×
		Traveler	TDC	Running in operation count	—	0	10	5	×
		Traveler	CRUSW	Bobbin rubbing prevention switch	—	Valid	Invalid	Invalid	×
		Traveler	CRU	Bobbin rubbing prevention coefficient	—	0.80	1.00	1.00	×
		Roving	Rov	Roving name	Max. 16 alphanumeric characters				○
		Roving	RovLen (m)	Roving length (m)	m	100	40000	2000	○
		Roving	RovLen (yd)	Roving length (yd)	yd	110	43746	2187	○
		Roving	RovWarn	Roving replacement warning	—	Valid	Invalid	Invalid	○
		Roving	RovCyc	Roving replacement cycle	doff	0	99	5	○
		Roving	RovStopSW	Auto stop function switch	—	Valid	Invalid	Invalid	○
		Roving	RovStopRate	Auto stop bobbin rate	%	0	100	50	○
		For MONI	PSP	Number of production spindles	—	0	1200*	1008	○
		For MONI	PCOFF	Production efficiency	%	50.0	100.0	100.0	○
		Pattern	N0	Spindle initial speed	rpm	2000	25000*	10000	○
		Pattern	Nx	Spindle pattern speed	rpm	0	25000*	0	○
		Pattern	Bx		%	0	100	0	○
		Pattern	PS	Pattern selection	—	0	9	0	○
		Pattern	Px	Number of pattern repetitions	times	0	99	0	○
		Fancy	Fancy yarn pattern can be edited only by the software on the PC.						—

[2] RX Operation

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
		Heaving	L2	2nd moved-up position	mm	20	200	65	×
		Heaving	L3	Down speed change position	mm	0	100	30	×
		Heaving	L5	Winding start position	mm	0	40	10	×
		Heaving	tS0	Motor start time	sec	-3.0	9.9	0.4	×
		Heaving	tS2	2nd moving-up time	sec	0.0	9.9	0.8	×
		Heaving	tDS	Draft delayed start	sec	0.0	9.9	0.2	×
		Heaving	ACCS	Acceleration rate during heaving (up to 5000 rpm)	r/s	500	3000	1000	×
		Heaving	ACC1	Acceleration rate during heaving (5000 rpm to N0)	r/s	500	3000	2000	×
		Heaving2	Nbs	Individual spindle speed before second movingup	rpm	0	5000	3000	×
		Heaving2	tBS0	Nbs time	sec	0.0	9.9	0.0	×
		Heaving2	Ssw	Slow speed during 2nd moving-up	—	Valid	Invalid	Invalid	×

7.1A.14 Setting Value List

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
		Heaving2	Nss	Heaving 1st constant speed	rpm	0	5000	3000	×
		Heaving2	tS1	Nss time	sec	0.0	9.9	0.0	×
		Heaving2	DRacc	Draft acceleration rate during heaving	rpm/s	50	300	100	×
		Heaving2	CL	High-speed winding count during heaving	—	0	9	0	×
		Optimum stop and restart	RD	Rail downward travel at restarting	mm	0.0	50.0	0.0	×
		Optimum stop and restart	tD1	FR delayed start time	sec	0.0	1.0	0.2	×
		Optimum stop and restart	ACCR	Acceleration at restarting (to 5000 rpm)	r/s	500	2000	1000	×
		Optimum stop and restart	ACC2	Acceleration at restarting	rpm/s	500	2000	2000	×
		Optimum stop and restart	NSC	Cushion restarting rpm	rpm	5000	25000	10000	×
		Optimum stop and restart	tSC	NSC time	min	0.0	9.9	0.0	×
		Optimum stop and restart	L7	Optimum stop position	%	0	100	70	×
		Optimum stop and restart	DEC1	Deceleration rate	rpm/s	200	2000	1000	×
		Optimum stop and restart	STL	Stop synchronization level (for optimum stop)	—	0	+4	+1	×
		Full bobbin stop	L1	First moved-up position	mm	-10	50	10	×
	Full bobbin stop	Full bobbin stop	t61	Spindle brake timing	sec	0.0	2.0	0.5	×
		Full bobbin stop	NSB2	Brake rpm	rpm	800	2000	1200	×
		Full bobbin stop	STL2	Stop synchronization level (For full bobbin stop)	—	0	+4	+2	×
		Full bobbin stop	STL3	Synchronization stop level (energy-saving motor type only)	—	0	+6	+3	×
		Full bobbin stop	DEC2	Deceleration rate 2	r/s	500	3500	2500	×
		Bunch winding	L6SW	Top bunch	—	Valid	Invalid	Invalid	×
	Bunch winding	Bunch winding	L6	Top bunch position	mm	155	255	200	×

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
		Bunch winding	nT	Number of top bunch windings	—	−1	+1	0	×
		Bunch winding	ADW	Number of advance windings	—	−3	+3	0	×
		Bunch winding	L0	Bottom bunch position	mm	−10	50	−8	×
		Bunch winding	nB	Number of bottom bunch windings	—	−1/2	+3/2	0	×
		Others	RD2	Down-movement of the ring rail at start (after power failure)	mm	0.0	50.0	10.0	×
			tDS2	Draft delayed start (after power failure)	sec	0.0	5.0	0.0	×
			STL4	Power failure stop draft stop timing	—	0	+4	+1	×
			DEC3	Deceleration rate before power failure stop	rpm/s	500	2000	1500	×

[3] User Settings

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
		Unit	U_LEN	Bobbin yarn length (m-HK)	[HK], [m]				○
		Unit	U_Nx	Bobbin yarn count (Ne-Nm-TEX)	[Ne], [Nm], [Tex]				○
		Unit	U_Tw	Bobbin yarn twist multiplier (TPI-TPM)	[TPI], [TPM]				○
		Unit	U_ROVW	Roving grain (gr/30 yd, g/m, Ne, Nm)	[gr/30 yd] [g/m] [Ne] [Nm]				○
		Unit	U_ROVL	Roving length (m-yd)	[m] [yd]				○
		Display	RX	RX name	Max. 6 alphanumeric characters				○
		Display	DPNX	Home screen yarn count display	—	Provided	Not provided	Provided	○
		Display	DPTM	Home screen twist count display	—	Provided	Not provided	Provided	○
		Display	DPRW	Home screen roving change warning display	—	Provided	Not provided	Not provided	○
		Display	DPMW	Home screen maintenance warning display	—	Provided	Not provided	Provided	○
		Display	DPDT	Date display format	—	TYPE1	TYPE2	TYPE1	○
		Lamp	tPF	Full bobbin advanced notice time (yellow lamp)	min	0	120	10	○
		Protect	AR*	Operation error prevention setting	—	Necessary	Un-necessary	Un-necessary	○
			PP	Spinning condition password	—				○
		Password		Password change	—	4 alphanumeric characters		1414	○

[4] Initial Settings and Adjustment

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
		Basic setting	Rn	Ring name	Max 16 alphanumeric characters				×
		Basic setting	R	Ring diameter	mm	30	60	41	×
		Basic setting	NMAX	Max speed	rpm	5000	25000	22000	×
		Basic setting	DMP	Motor pulley Induction motor type→ Energy-saving motor type→	mm	100	280	213	×
					T	30	60	42	
		Basic setting	DDP	Drive pulley Induction motor type→ Energy-saving motor type→	mm	100	280	193	×
					T	30	60	46	
		Basic setting	SP	Number of spindles	—	0	1824	1008	×
		Basic setting	SZ	Twist direction	—	Z	S	Z-twist	×
		Basic setting	MFG	MFG No.	—	0	999999	0	×
		Basic setting	Sn	Specification No.	Max 16 alphanumeric characters				×
		Basic setting	Un	User name	Max 16 alphanumeric characters				×
		Power failure	PDsw	Continuous operation function	—	Ineffective	Effective	Effective	×
		Bobbin constants	BL	Bobbin length	mm	165	255	210*	×
		Bobbin constants	DE1	Bobbin top dia.	mm	20.0	30.0	27.0*	×
		Bobbin constants	DE2	Bobbin end dia.	mm	15.0	25.0	21.0*	×
		SP offset	SRC	Slip offset (twist multiplier correction)	%	−5.0	+5.0	0.0	×
		SP offset	SMC	Spindle measuring offset	%	−5.0	+5.0	0.0	×
				RR origin adjustment					×
	OTHER INIT	Others	tFBL	Backlight off time	min	1	60	10	○
			CSPsw	Command circuit check function		Invalid	Valid	Valid	○

[5] Device Settings

Menu screen	Sub menu	Page	Symbol	Name	Unit	Minimum value	Maximum value	Initial value	Change during running
CLEANER 		Cleaner	tBL1	Blower intermittent operation time	min	0.0	120.0	0.0	☐
		Cleaner	tBL2	Blower escape time	min	0	120	10	☐
		Cleaner	MAS	Blower operation upon machine stop	—	Stop	Operation	Retraction	☐
		Fly collector	tPN	Pneumatic cleaner stop time	sec	0	20	10	☐
		Fly collector	PBM	Blow operation during fly collection	—	Valid	Invalid	Valid	☐

8.1A Instrumentation (Electronic Draft Specification)

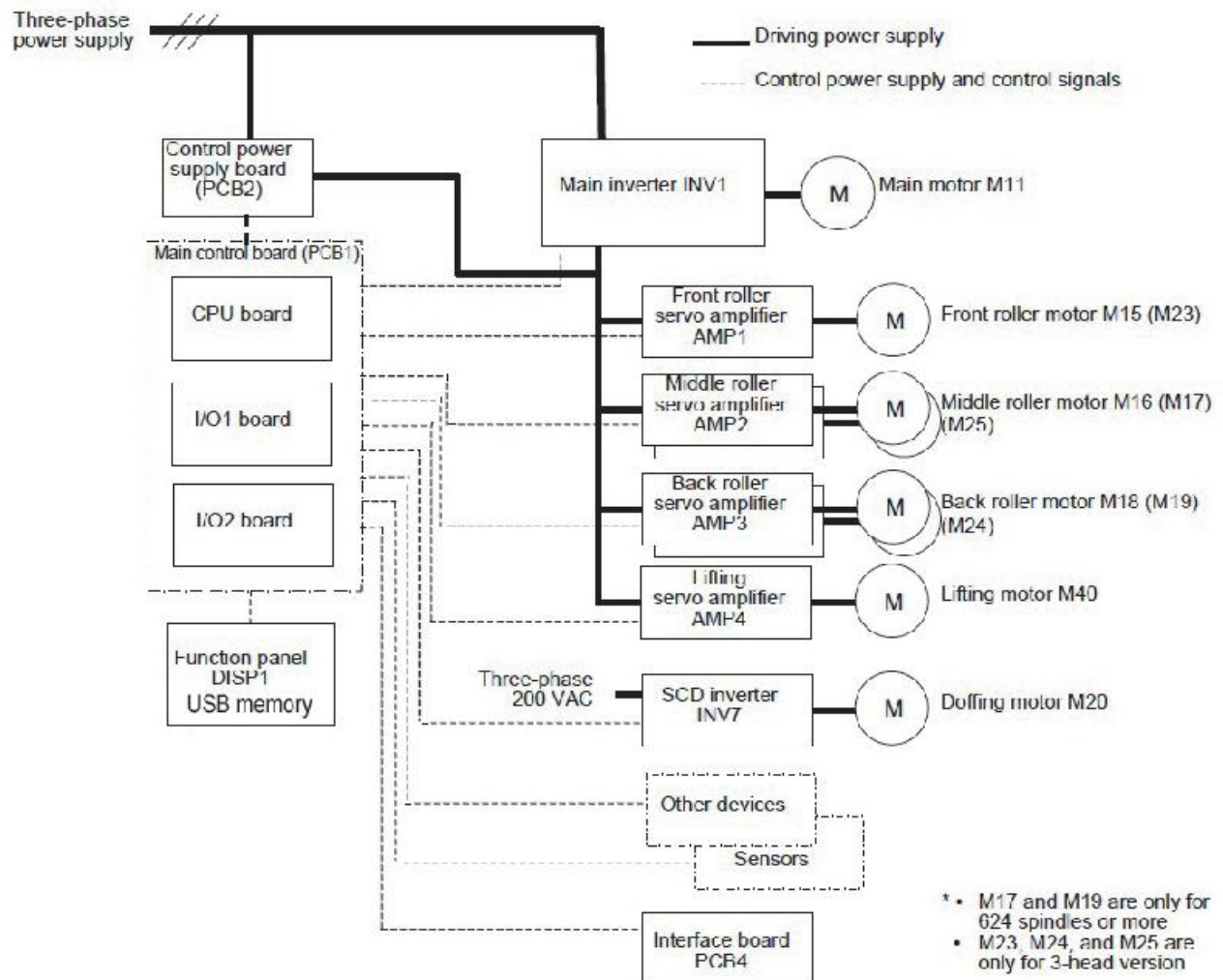
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8.1A.1 Overview of Each Device

[1] Main Block



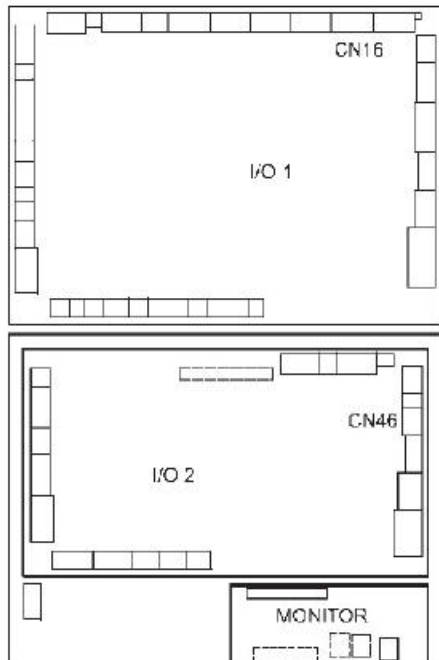
8.1A.1 Overview of Each Device

Device name	Symbol	Function
Main control board	PCB1	RX control device CPU board : Program execution-operation board and communication with function panel I/O1 and I/O2 : Boards for communication with each device, and for inputs and outputs
Control power supply board	PCB2	Board generating the power supply required for control • 5 VDC : CPU power supply • 12 VDC : I/O input power supply • 24 VDC : I/O output power supply • ± 15 VDC : Analog circuit power supply
Interface board	PCB4	GE wiring relay board
Function panel	DISP1	Color display unit with input touch panel • Performs RX control status display, setting input and monitor display.
USB memory		• USB memory for data storage and reading • General-purpose memory card for data storage and reading, and control program downloading • 2 GB standard flash memory
Main motor and inverter	M11 INV1	Spindle and draft driving motor and its inverter • Motor : Induction motor type..... 380V 60Hz 4P 20-60kw rating Energy-saving motor type.... 380V 90Hz 6P 65-85kw • Inverter : 380 V, 75-110 kW rating
Front roller motor and servo amplifier	M15 (M23) AMP1	Front roller driving servo motor and servo amplifier • Rating : 6 kW 2000 rpm (M15) 3 kW 2000 rpm (M23) • With thermostat
Middle roller motor and servo amplifier	M16 (M17) (M25) AMP2 (AMP9)	Middle roller driving servo motor and servo amplifier • Rating : 1.6 kW, 3000 rpm (normal yarn specification) 5 kW, 3000 rpm (fancy yarn specification) 3.3kW, 3000rpm(2 heads, 1248 to 1440 spindles for ordinary yarn) • With thermostat
Back roller motor and servo amplifier	M18 (M19) (M24) AMP3 (AMP8)	Back roller driving servo motor and servo amplifier • Rating : 1.6 kW 3000 rpm (2-head version) 2.5 kW 3000 rpm (3-head version)
Lifting motor and servo amplifier	M40 AMP4	Lifting driving servo motor and servo amplifier • Rating : 1.6 kW 3000 rpm (1200 spindles or less for 2-head version) 2.5 kW 3000 rpm (1248 to 1440 spindles for 3-head or 2-head version)
Doffing motor and inverter (on RX with SCD)	M20 INV7	Doffing bar up/down motor and inverter • Motor : 200 V, 60 Hz, 4P, 1.5 kW rating • Inverter : 200 V, 2.2 kW, PG-less vector control rating

- * • M17 and M19 are only for 624 spindles or more
• M23, M25, AMP9, M24, and AMP8 are only for 3-head version

[2] Main Control Board

[2.1] Configuration



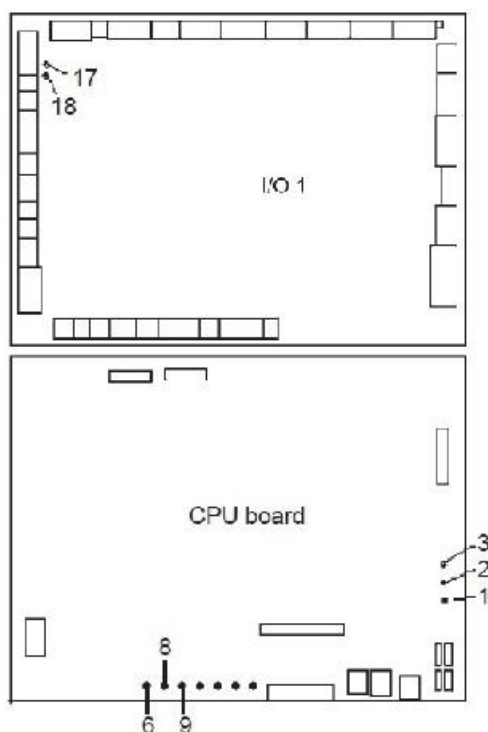
The main control board consists of three boards: CPU, I/O1 and I/O2.

CPU board : Board installed with a microprocessor for program execution, arithmetic operation and communication with the function panel.

I/O1 board : Control board mainly for spindle, draft, lifting and other RX operations

I/O2 board : Control board mainly for SCD and tray control

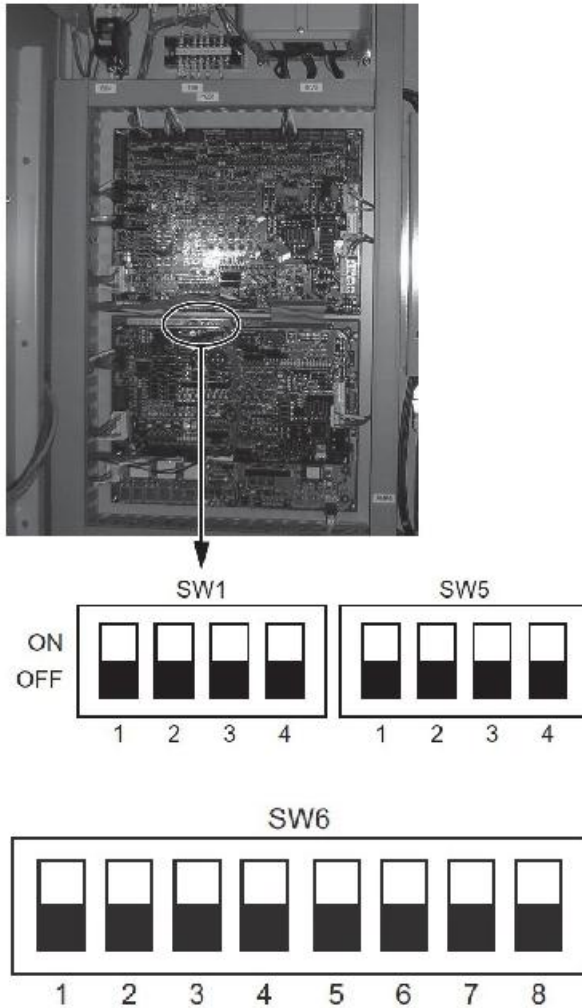
[2.2] Main control board indicator lamps



- 1 : LED1 (red)
For checking communication with the function panel. Off if normal.
- 2 : LED2 (yellow)
For checking communication with the function panel. Blinks if normal.
- 3 : LED3 (green)
For checking communication with the function panel. Blinks if normal.
- 6 : LED (red)
For checking control microprocessor operation. Off if normal.
- 8 : LED8 (yellow)
For checking control microprocessor operation. On if normal.
- 9 : LED9 (yellow) For checking control microprocessor function. On if normal.
- 17 : LED17 (green)
For checking SCD encoder (PG7) operation. On during SCD doffing bar up/down motion if normal. (Actually blinking but looks continuous on because of very short intervals.)
- 18 : LED18 (green)
For checking SCD encoder (PG7) Operation. On during SCD doffing bar up/down motion if normal. (Actually blinking but looks continuous on because of very short intervals.)

[2.3] CPU board DIP switches

The CPU board is installed in the OE control box
(inner side of the function panel door).

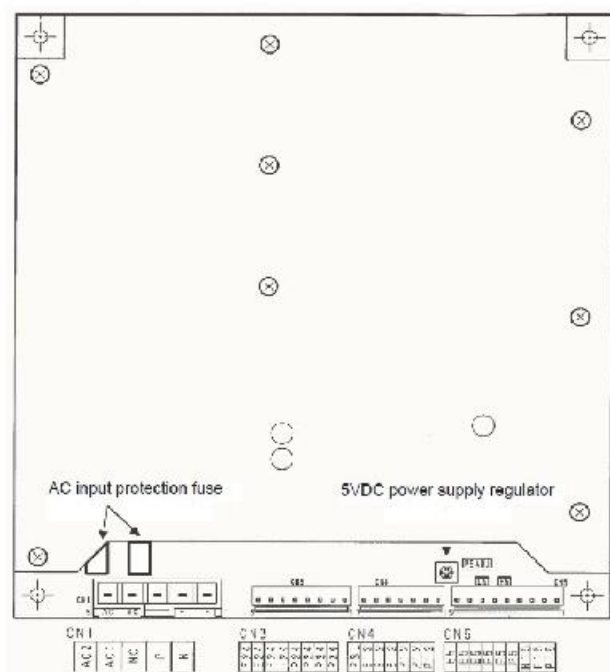


Switch	No	Function	OFF	ON
SW1	BIT1	Boot ROM write protection	Boot ROM write disabled	Boot ROM write enable
	BIT2	Main control ROM write protect	Main control ROM write disabled	Main control ROM write enabled
	BIT3	Starting program	Startup by main control ROM	Startup by boot RM
	BIT4	(Unused)	(Ordinary)	—
SW5	BIT1	Internal information initialize	(Ordinary)	Used only upon replacement with new board
	BIT2	Startup screen selection	Home screen	RX specification selecting screen
	BIT3	Selection of electromagnetic brake specification	(Ordinary)	Electromagnetic brake specification
	BIT4	RAM clear-protection	Disable manual RAM clear	Enable manual RAM clear
SW6	BIT1-8	(Unused)	(Ordinary)	—

NOTE: Always set all off during normal operation.

(For RX with electromagnetic brake, only SW5-BIT3 is ON.)

[3] Control Power Supply Board



Supplies the DC power to the main control board.

■ Power supply specifications

Power input	Terminal No.	Voltage
AC input	AC1, AC2	AC380V~AC460V
DC input	P, N	DC300V ~DC800V

Power Output	Terminal No.	Voltage	Max. current	Applications
DC5 V	P5, E5	DC5 V	6 A	For CPU and logic circuit
DC12 V	P12, E12	DC12 V	2.5 A	For input interface
DC24 V	P24, E24	DC24 V	7 A	For output interface
DC15 V	P15, N15,E15	DC15 V(±)	0.2 A	For analog circuit

- This power supply is equipped with two inputs of AC and DC. In the event of a power failure, regenerative electric power from DC input is received to stop the machine safely. (For operations at the time of power failure, refer to Section 8.1A.2 [4].)



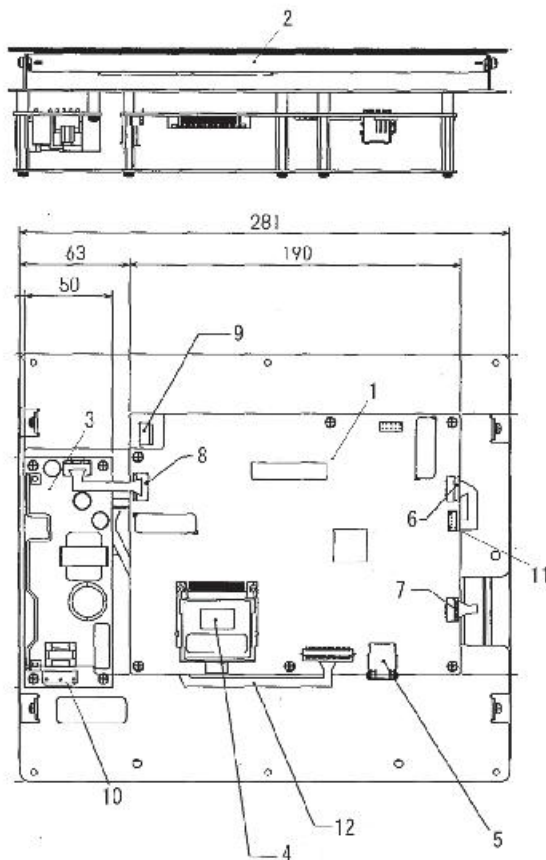
⚠ WARNING

When you need to touch the power supply board, observe the instructions given in

- S.1 "Safe Work"
- S.1.4 "Rules for Handling and Inspecting Electrical Units"

Also, never touch this power supply board even after turning the power off because a risk of electric shock is present while the capacitor of the main circuit is charged.

[4] Function Panel

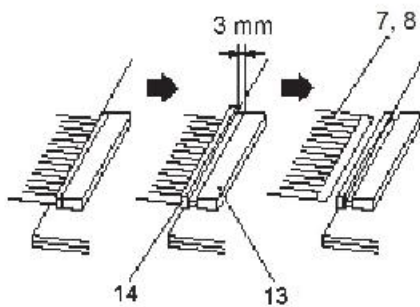


The function panel consisting of a 12.1-inch color LCD panel (with a touch panel) and a panel control board provides RX control status display, setting inputs, and monitor display.

- 1 : Panel CONTROL board
- 2 : LCD panel with a touch panel
- 3 : Switching power supply
- 4 : CF card with firmware
- 5 : Ethernet connector
(communication with main control board)
- 6 : PCAP cable
- 7 : Back light harness
- 8 : Power harness
- 9 : Membrane switch connector
- 10 : 100 VAC input connector
- 11 : USB memory harness connector
- 12 : LVDS harness

The LCD panel and touch panel are located on the rear side of the control board with a sheet metal inbetween.

They appear when the function panel is removed with the unit.



NOTE: For LVDS and PCAP harness disconnection, always pull out both ends on outer side 14 of socket 13 equally by 3 mm each for unlocking before disconnecting the harness. For harness insertion, insert the harness to the connector and push both ends 13 of socket 14 for locking.

[5] USB memory

[5.1] General



The RX300 has a USB memory interface as the standard feature.

It is possible to use the USB memory to store and load the setting data.

Since the stored data files use Microsoft's Windows® formats, they can be referenced as text files on the personal computer.



Insert the USB memory into the slot as shown at left, and push it until it clicks in position.



■ Specifications of USB memory supplied with the RX

- Product type : UDG4-2GDRJS
- USB port type : USB A-Type connector
- Interface : USB 2.0 (High Speed)/USB 1.1 (Full Speed)
- Memory capacity : 2GB

NOTE: Though the USB memory specifications are of ordinary type, operation cannot be guaranteed if any other USB memory is used. It is recommended to use the USB memory delivered with the RX.

[5.2] The USB memory containing the main control master program

Since the new CPU board is not installed with the main control program for RX operation, it is always necessary to install the main control program whenever the CPU board is replaced. The USB memory is supplied for necessary installation.

■ File in the card

R9961-xxxxx-yy(main control program)

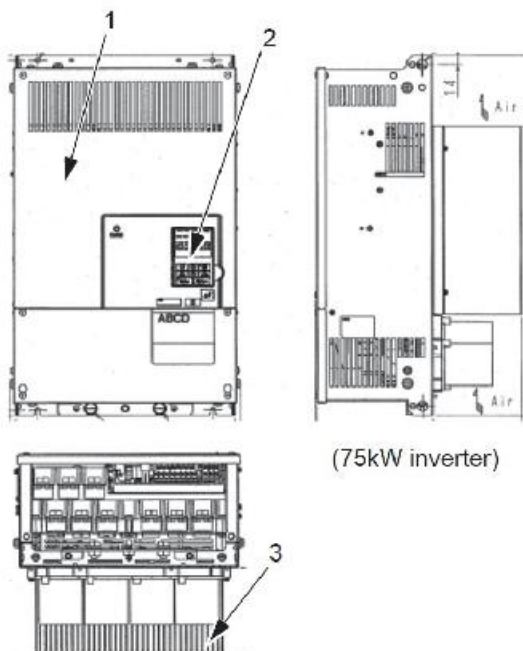
xxxxx : RX specification No.

-yy : Program version

(-00, -0A or -0B, for example)

IMPORTANT: The RX does not run correctly unless the program matching the RX specifications is installed. Keep this USB memory carefully.

[6] Main Inverter



The main inverter controls speed shifting of the spindle drive motor M11.

1 : Inverter body

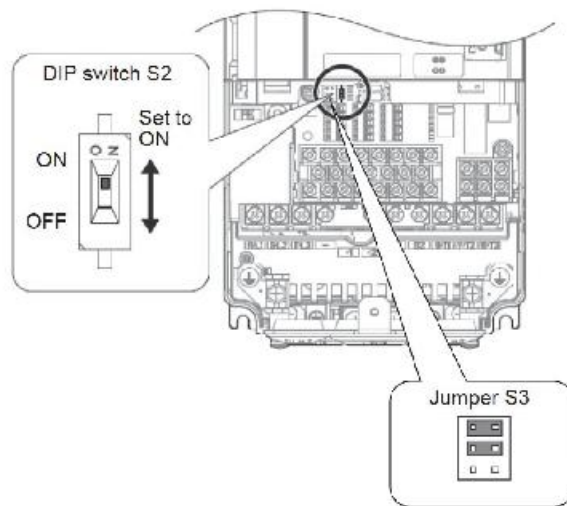
2 : Digital operator

3 : Radiation fin

[6.1] Specifications

Type CIMR-F7Y4075		Specification	
Maximum applicable motor capacity		75 kW (2-head version)	110 kW (3-head version)
Output ratings	Output capacity	110 kVA	165 kVA
	Rated output current	150 A	216 A
	Maximum output voltage	3-phase, 380/400/415/440/460/480 V (corresponding to input voltage)	
	Maximum output frequency	400 Hz	
Power supply	Rated voltage, rated frequency	3-phase, 380/400/415/440/460/480 V, 50/60 Hz	
	Allowable voltage fluctuation	-15% ~ +10%	
	Allowable frequency fluctuation	±5%	
Calorific value	Calorific value at radiation fin	1340 W	2360 W
	Calorific value inside the unit	580 W	715 W
	Total calorific value	1920 W	3075 W
Control characteristics	Control system	Sinusoidal PWM system (V/f control without PG, V/f control with PG, vector control without PG)	
	Frequency control range	0.01 Hz ~ 400 Hz	
	Frequency accuracy (temperature variation)	Digital command: ±0.01% (-10°C to +40°C) Analog command: ±0.1% (25°C ± 10°C)	
	Frequency resolution	Digital command: 0.01 Hz Analog command: 0.03 Hz/60 Hz (10 bits, unsigned)	
	Output frequency resolution (Arithmetic operation resolution)	0.001 Hz	
	Acceleration/deceleration time	Setting of time from 0 Hz to maximum output frequency)	
	Overload resistance and maximum current	150% of rated current for 1 minute	

[6.2] Inverter setting

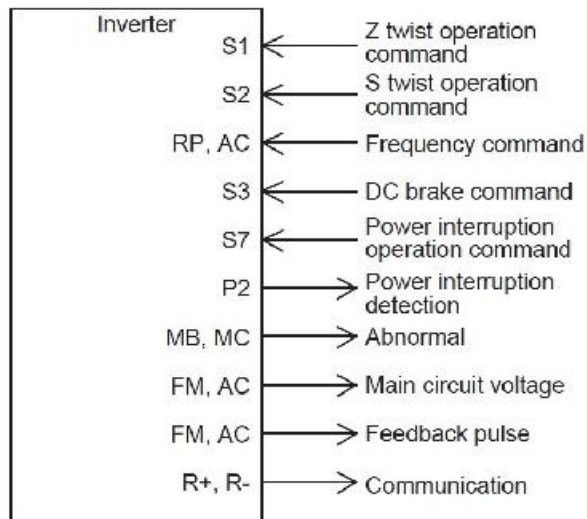


(1) Control board setting

The figure at left shows the settings of jumper S3 and DIP switch S2 on the inverter control board.

(No user setting is necessary because they have been set at the time of shipment.)

[6.3] Control interface



[Z twist operation command]:

Inverter operation command for Z twist

[S twist operation command]:

Inverter operation command for S twist

[Frequency command]:

Inverter output frequency command for motor speed variation in terms of pulse train frequency

[DC brake command]:

Command for DC brake application to the motor

[Power interruption operation command]:

Command for instructing the inverter to perform power-interrupted stop

[Power interruption detection]:

Information on power interruption

[Abnormal]:

Information on inverter abnormal state

[Main circuit voltage]:

Signal for monitoring the main circuit voltage upon power-interrupted stop

[Feedback pulse]:

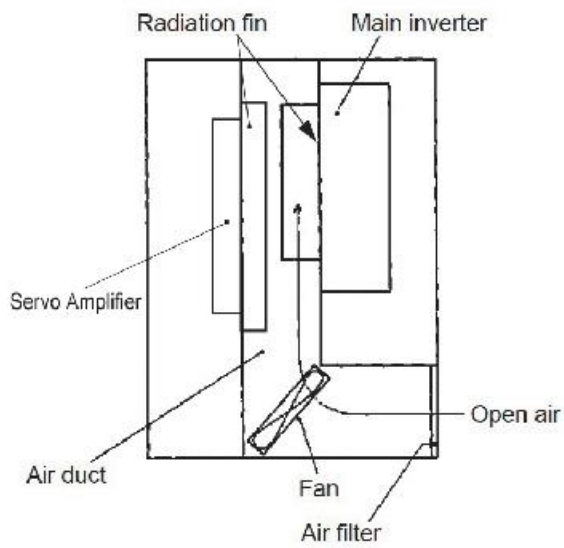
Signal for synchronizing the spindle and draft upon stopping by power interruption

[Communication]:

Communication between inverter and main control board through RS-485 interface

NOTE: For detailed specifications and handling, refer to the inverter manufacturer's standard instruction manual attached to the RX.

[6.4] Cooling fan



The inverter is cooled by the fan that sends open air to the radiation fin protruding into the air duct on the rear side.

[7] Servo Motors and Amplifiers

[7.1] Servo motors

Servo motors drive the draft and lifting parts.

■ Specifications of each motor

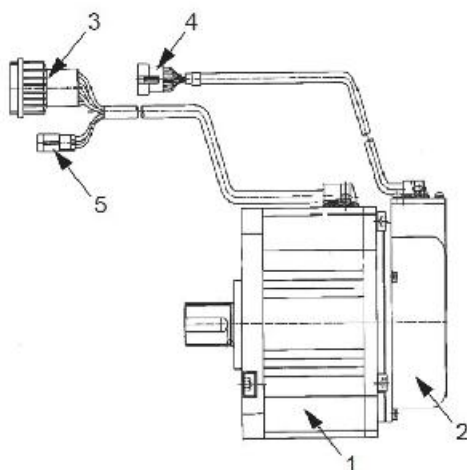
Driven part	Motor capacity kW	Rated speed rpm	Seal structure	Thermostat
Front roller	6 (3) ^{*3}	2000	Without oil seal	Provided
Middle roller	1.6 (5) ^{*1} (3.3) ^{*4}	3000	Without oil seal	Provided
Back roller	1.6	3000	Without oil seal	Not provided ^{*2}
Lifting	1.6kw (2-head version)	3000	With oil seal	Not provided
	2.5kw (3-head version)			

^{*1}: 5 kW in the case of fancy yarn specification.

^{*2}: Provided on the motor but not used.

^{*3}: 3 kW for the motor M23 installed at 3-head version.

^{*4} : 3.3 kW for 1248 to 1440 spindles with 2-head version



1 : Motor body

2 : Resolver (rpm detector) portion

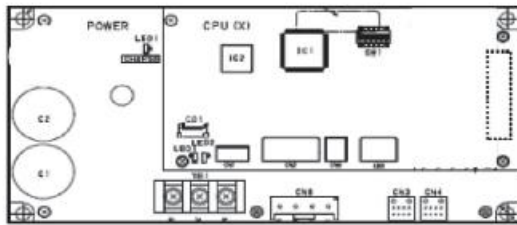
3 : Power cable connector

4 : Resolver cable connector

5 : Thermostat cable connector^{*1}

^{*1} The thermostat cable is used only for the front and middle rollers.

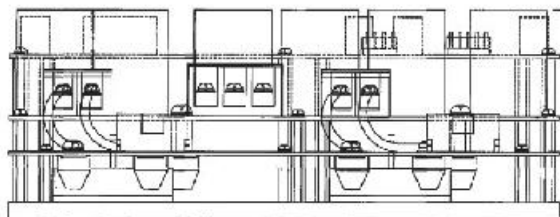
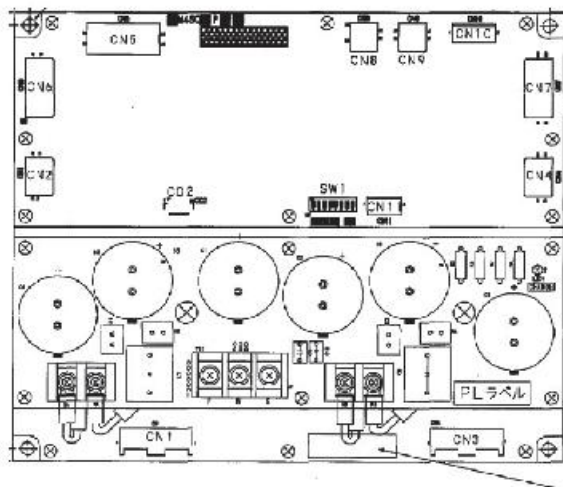
[7.2] Servo amplifiers



Shape of servo amplifier for 1 shaft

The shape of servo amplifier for 1 shaft is as illustrated at left.

Capacitors C3 and C4, however, are not installed for the 1.6 kW motor.



Shape of servo amplifier for 2 shafts

The shape of servo amplifier for 2 shafts is as illustrated at left.

Capacitors CS3 to CS6, however, are not installed for the 1.6 kW motor.

(1) Specifications

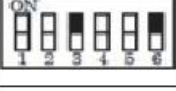
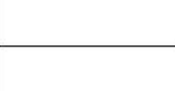
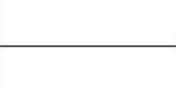
There are four types of servo amplifier in total;

There are two types capacity regarding: For 6.0/5.0/2.5 kW, and for 1.6 kW. In addition, there are two types regarding the possible number of driving: For 1 shaft, and for 2 shafts.

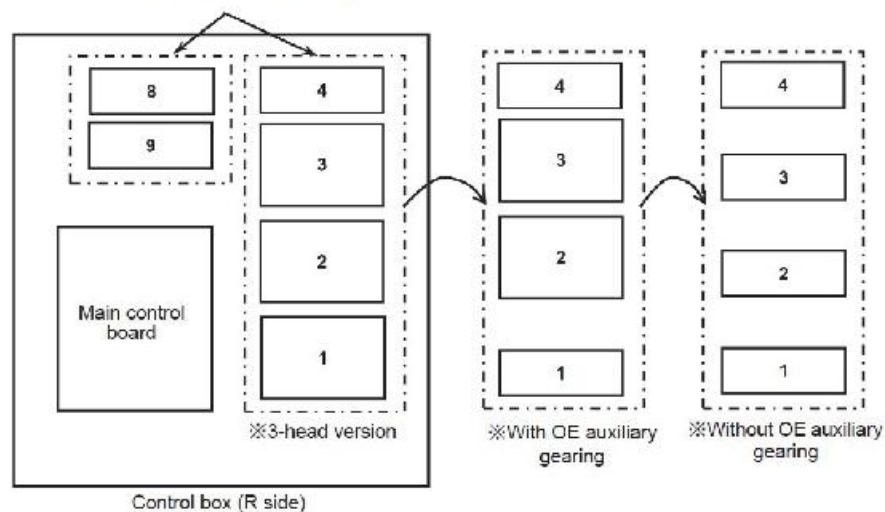
Model		For 1 shaft : VLASX-020T6 For 2 shafts : VLASX-W020T6	For 1 shaft : VLASX-050T6 For 2 shafts : VLASX-W050T6			
Control method		PWM 3-phase sine wave				
Main circuit power voltage		DC530 V ~ DC650 V				
Control power voltage		For 1 shaft: 24 VDC ± 10% For 2 shafts: 5 V ± 5%, ± 15 V ± 5%				
Applicable motor manufactured by Tamagawa Seiki		- Rated output:1.6kW - Rated speed:3000 min⁻¹ (max:4500 min⁻¹) - Rated current:4.8 A (rms) (Instantaneous max: 13.9 A(rms)) - Torque constant:1.12 (N•m/A)	- Rated output:6.0 kW - Rated speed:2000 min⁻¹ (max:3000 min⁻¹) - Rated current:18.1 A (rms) (Instantaneous max: 44.8 A(rms)) - Torque constant:1.61 (N•m/A)	- Rated output:3.3 kW - Rated speed:3000 min⁻¹ (max:4500 min⁻¹) - Rated current:9.6 A (rms) (Instantaneous max: 27.9 A (rms)) - Torque constant:1.14 (N•m/A)	- Rated output:2.3 kW - Rated speed:1500 min⁻¹ (max:2000 min⁻¹) - Rated current:8.74 A (rms) (Instantaneous max: 25.6 A (rms)) - Torque constant:1.78 (N•m/A)	
			- Rated output:5.0 kW - Rated speed:3000 min⁻¹ (max:4500 min⁻¹) - Rated current:14.8 A (rms) (Instantaneous max: 43.3 A (rms)) - Torque constant: 1.12 (N•m/A)	- Rated output:2.5 kW - Rated speed:3000 min⁻¹ (max:4500 min⁻¹) - Rated current:9.6 A (rms) (Instantaneous max: 27.7 A (rms)) - Torque constant:0.90 (N•m/A)	- Rated output:3 kW - Rated speed:2000 min⁻¹ (max:3000 min⁻¹) - Rated current:9.1 A (rms) (Instantaneous max: 21.7 A (rms)) - Torque constant: 1.69 (N•m/A)	
Continuous current rating		4.7 A (rms)	19.8 A (rms)			
Instantaneous max current (Instantaneous max torque)		14.14 A (rms) (15.83 N•m)	41.6 A (rms) (67.08 N•m)			
Speed position detector		Resolver (20 kHz, 2-phase excited, single-phase output)				
Counter current absorption capacity		None				
Mass		1.6 kg (3.0 kg for 2 shafts)	1.7 kg (3.3 kg for 2 shafts)			
Outside dimensions (mm) (H x W x D)		120 × 250 × 95 (210 × 250 × 100 for 2 shafts)	120 × 250 × 95 (210 × 250 × 100 for 2 shafts)			
Amplifier structure		Open frame				
Interface		RS485 communication				
General-purpose input		24 VDC, 6 mA, 5 ports (3 ports for 2 shafts) Both sink (negative common) and source (positive common) connections are possible.				
General-purpose output		12 VDC, 10 mA, 5 ports (3 ports for 2 shafts) Both sink (negative common) and source (positive common) connections are possible.				
General-purpose input/output power supply		External supply of 24 VDC and 12 VDC				
Position control	Number of divisions	Resolver: 24,000 P/rev (single-pulse shift can be set as 65,535/65,535)				
	Command pattern	Forward/reverse revolution pulse (phase A/phase B pulse and forward-reverse signal/feed pulse may be used), 2.3 to 3.5 VDC input voltage, 16 mA photo coupler input, frequency: 500 kHz (max.)				

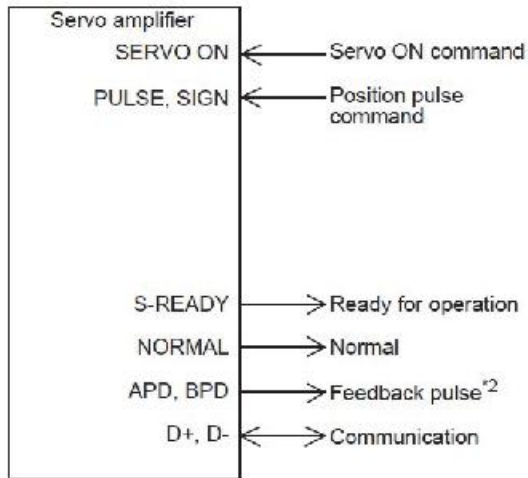
(2) Setting method

NOTE: Note that the servo amplifier setting varies with the position of the applicable motor.

		3-head version (1248 ~ 1824 spindle)		With OE auxiliary gearing (624 ~ 1440 spindle)		Without OE auxiliary gearing (~ 576 spindle)	
Amplifier Symbol	Use (Upper row: A shaft, Lower row: B shaft)	Setting position (number of shaft)	DIP switch (SW1) setting	Setting position (number of shaft)	DIP switch (SW1) setting	Setting position (number of shaft)	DIP switch (SW1) setting
AMP9	Middle roller • For GE motor	9 (For 1 shaft)		—		—	
AMP8	Backroller • For GE motor	8 (For 1 shaft)		—		—	
AMP4	Lifting	4 (For 1 shaft)		4 (For 1 shaft)		4 (For 1 shaft)	
AMP3	Backroller • For ME(GE) motor • For OE motor	3 (For 2 shafts)		3 (For 2 shafts)		3 (For 2 shafts)	
AMP2	Middle roller • For ME(GE) motor • For OE motor	2 (For 2 shafts)		2 (For 2 shafts)		2 (For 2 shafts)	
AMP1	Front roller • For ME(GE) motor • For OE motor	1 (For 2 shafts)		1 (For 2 shafts)		1 (For 2 shafts)	

Servo amplifier mounting positions





^{*2} The feedback pulse signal is provided only for the front roller motor and lifting amplifier.

(3) Control interface

[Servo ON command]:

Servo operation command

[Position pulse command]:

Motor rotation command by means of pulse train

[Ready for operation]:

Informs that the motor is ready for operation.

[Normal]:

Informs that the servo amplifier is normal.
OFF for abnormal stop.

[Feedback pulse]:

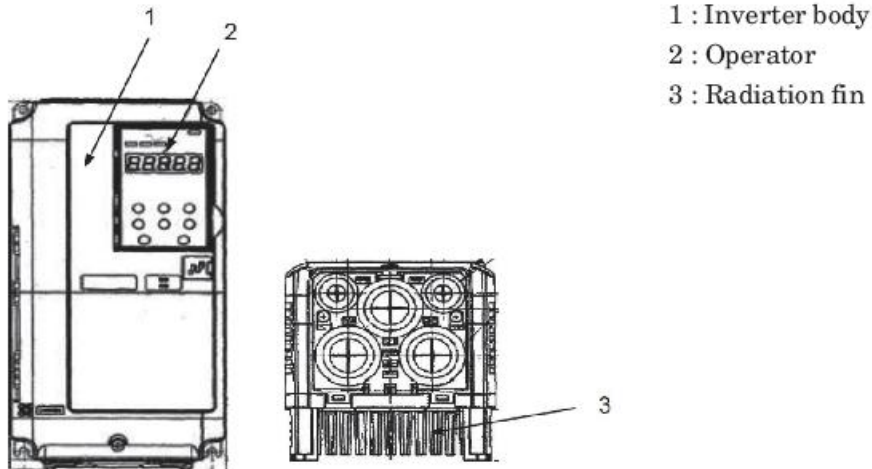
Servo motor rotation feedback pulse signal

[Communication]:

Communication between servo amplifier and Main control through RS485 interface.

[8] SCD Inverter (Only for RX with SCD Inverter)

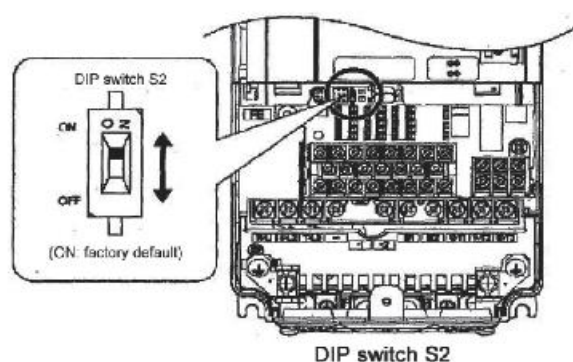
This inverter drives the SCD up/down motor with speed variation.



[8.1] Specifications

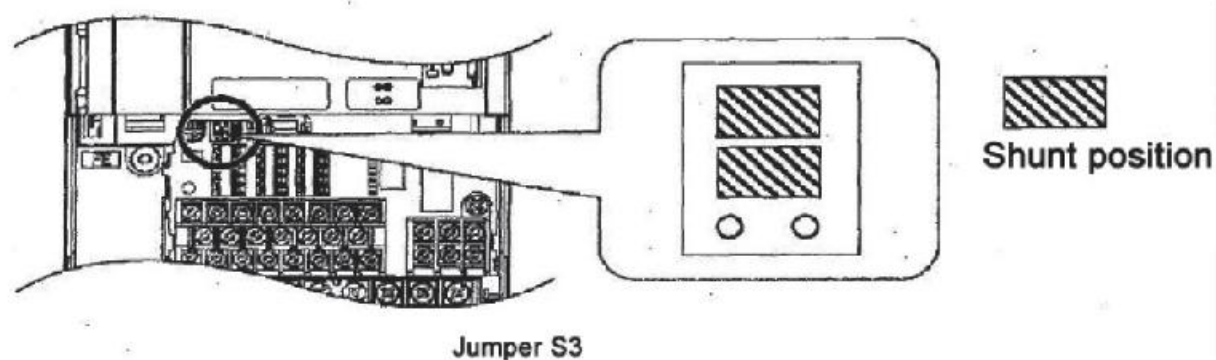
Item		Specification
	Model CIMR-AA2□□□□	0012
	Maximum applicable motor capacity	2.2 kW
	Output capacity	4.2 kVA
	Rated output current	11 A
	Cooling fin calorific value	63.7 W
	Unit internal calorific value	57.9 W
	Total calorific value	121.6 W
	Maximum output frequency	400 Hz
	Maximum output voltage	3-phase, 200 V to 240 V (corresponding to input voltage)
	Rated voltage	3-phase, 200/208/220/230/240 V
	Voltage fluctuation	-15% ~ +10%
	Frequency fluctuation	±5%
Control characteristics	Control system	V/f control without PG, V/f control with PG, or vector control without PG (selection by a constant)
	Frequency control range	0.01 Hz ~ 400 Hz
	Frequency accuracy (temperature variation)	Digital command: ±0.01% (-10 to +40°C) Analog command: ±0.1% (25°C ± 10°C)
	Frequency setting resolution	Digital command: 0.01 Hz, analog command: 0.03 Hz/60 Hz (11 bits)
	Output frequency resolution (calculated resolution)	0.001 Hz
	Acceleration/deceleration time	0.01 to 6000.0 sec (setting of time from 0 to maximum output frequency)
	Overload resistance	150% of rated output 1 minute
	Braking torque	Approx. 20% (depending on motor), about 125% with braking option

[8.2] Inverter control board setting



The DIP switch S2 and the jumper S3 on the inverter control board are set as shown in the left figure.

(Users have no need to set since these have been set prior to shipment.)



[8.3] Control interface

[Down operation command] :

Inverter operation command for moving doffing bar downward.

[Up operation command] :

Inverter operation command for moving doffing bar upward.

[Frequency command] :

Inverter output as pulse train frequency for varying the motor speed.

[Abnormal] :

Signal indicating inverter abnormality.

[Ready] :

Signal indicating that the inverter is ready for operation.

[Braking resistor] :

Resistor for consuming the regenerative energy during inverter deceleration.

[Braking resistor thermal switch]:

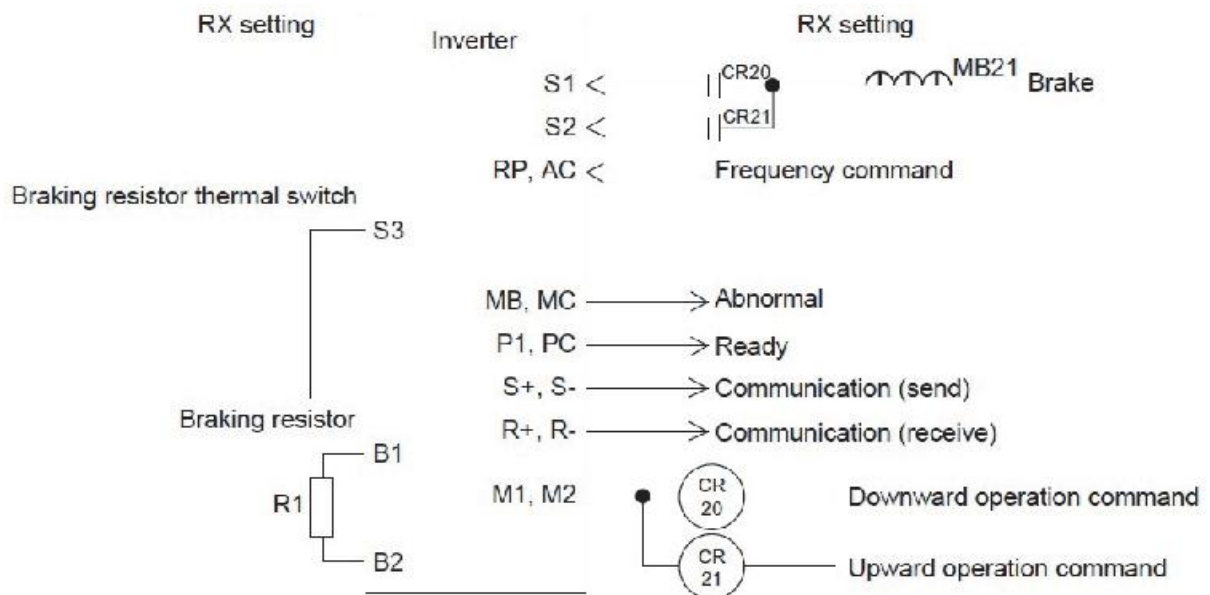
This switch detects braking resistor temperature rise, and causes abnormal stop upon excessive temperature rise.

[Brake] :

The brake is released when inverter operation starts.

[Communication] :

Communication between the inverter and main control through RS-422 interface.



NOTE: Please refer to the inverter manufacturer's standard instruction manual attached to the RX for detailed specifications and handling.

8.1A.2 Exceptional Operation

[1] Setting Change while Spinning is in Progress

Setting change is possible for the conditions shown below if the RX (including the SCD) is stopped:

What is to be changed	Condition
1) Spindle speed change condition	Always possible
2) Bobbin forming condition	Possible only during full bobbin stop
3) RX spec. condition	Possible only during full bobbin stop
4) Heaving or full bobbin moving-down condition	Always possible
5) SCD-related operation condition	Always possible
6) Others	Always possible

[2] Stop During Heaving

In any of the following cases, it is not possible to restart operation simply by pressing the start switch.

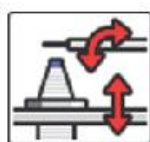
- When the RX stopped during heaving
- When the RX is brought to an emergency stop during heaving

In such a case, operate as follows to restart heaving:

[2.1] When the RX is stopped in the course of lappet reversing



[MANUAL]



[Lappet -Ring Rail]

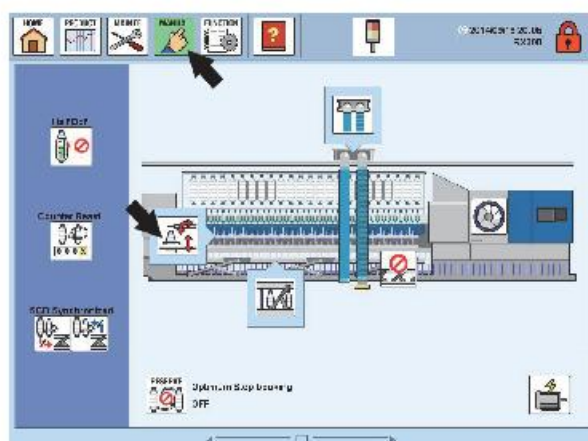


Fig. 1 Manual operation menu screen

- (1) On the manual operation menu screen displayed by touching the [MANUAL] icon on the top menu, touch the [Lappet -Ring Rail] icon to display the manual lappet - ring rail screen (Fig. 2).

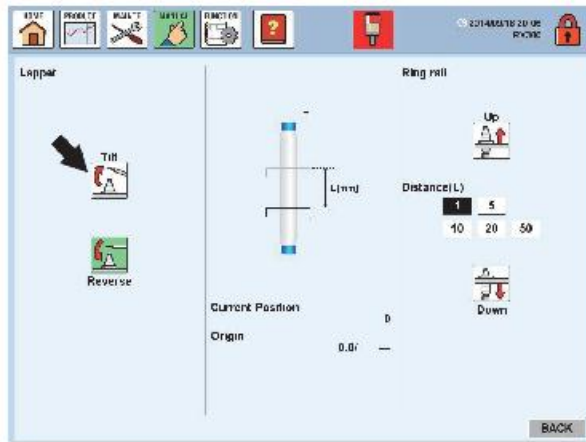


Fig. 2 Manual ring rail-lappet screen (1)

- (2) Touch lappet [Tilt] icon to tilt the lappet, and press the RX start switch then.

[2.2] When the RX is stopped after the lapper is fully reversed and while the ring rail is between the 2nd moved-up position and the start of winding

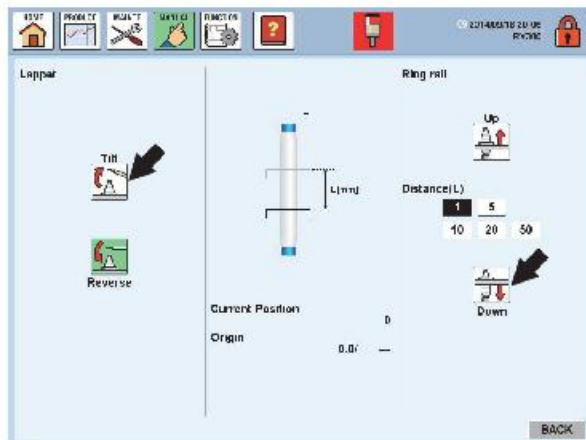


Fig. 3 Manual ring rail-lappet screen (2)

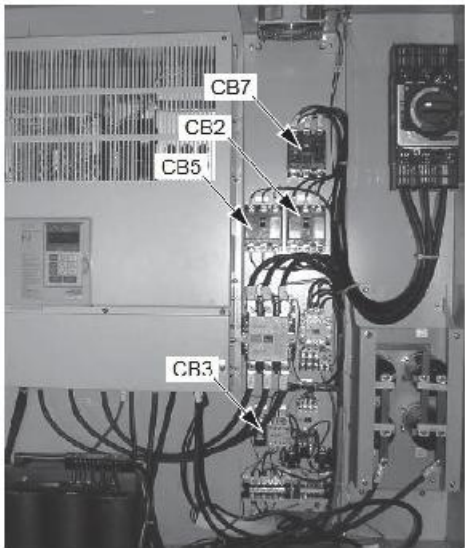
- (1) Touch the ring rail [Down] icon on the manual lappet - ring rail screen to bring the ring rail down. (Refer to Subsection 7.1A.5 [3])
- (2) Touch the lappet [Tilt] icon to tilt the lappet, and press the RX start switch then.

[2.3] When the RX is stopped immediately after the start of spindle rotation during heaving operation (stop before arrival at the winding start position)

Since restarting from this state starts bobbin winding from the stopped position to cause a high winding start position, take either of the following actions:

- Restart after manually bringing the ring rail down as close to the winding start position as possible. (Winding will start from the moved down position.)
- Repeat heaving all over again as explained in Subsection 8.1.2 [2.2] above.

[3] Machine Stop Due to CircuitProtector



Each power circuit (main breaker secondary side circuit, 210 VAC, and 100 VAC) has the following circuit protectors to protect the devices and wires from burn due to short-circuit:

CB7 is mounted in the compact yarn model

Circuit protector	Voltage	Current value	Remarks
CB2	Factory voltage source	30 A	
CB3	100 V	3 A	
CB5	210 V	10 A	
CB7	Factory voltage source	50 A	Mounted in the compact yarn model.

If any of the above circuit protectors trips, pin point the short-circuited section according to the flowchart given below.



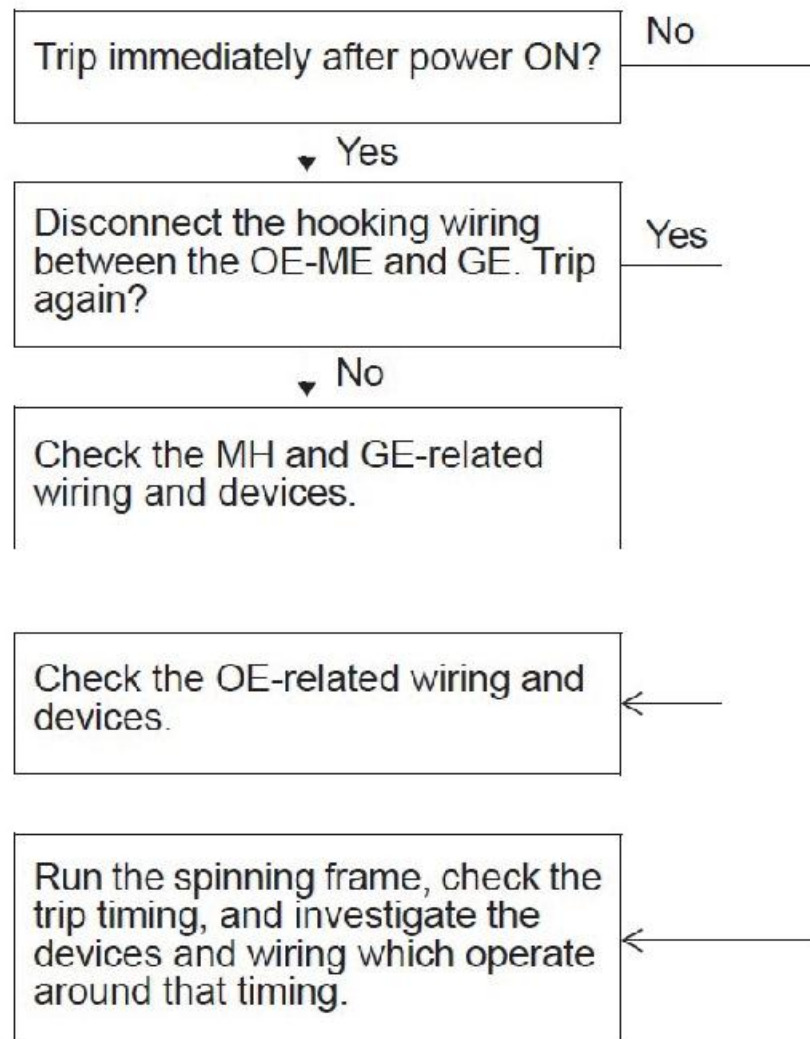
WARNING

Be sure to observe the precautions given in

S.1 “Safe Work”

S.1.4 “Rules for Operating or Checking the Electrical Devices”

Even after the main circuit breaker (CB1) is turned off, the inverters’ smoothing capacitors will remain charged for a while. It is DANGEROUS.



* MH is only for 3-head version

[4] Protective Operation at Power Interruption

On the RX, the spindle and draft, lifting are not mechanically connected. They are, therefore, made to stop synchronously at the time of power interruption to prevent resulting broken yarn.

If the power interruption short within 2 sec., the decelerating function for stopping is automatically reset to normal operation.

In this operation, all devices other than the SCD doffing motion (including the compact device if installed) are reset to the former operation modes.

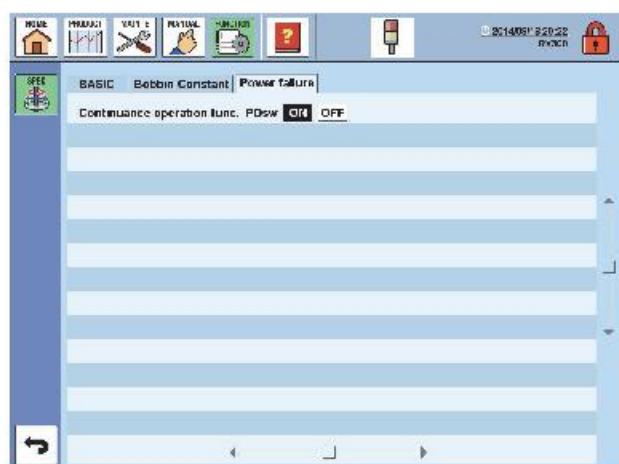
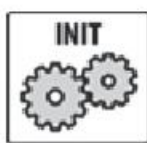
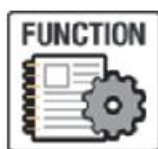
Under any of the following conditions, the machine always comes to a synchronized stop without automatic resetting.

- (1) When the power interruption occurs during oscillation or acceleration upon restarting.
- (2) Upon occurrence of power interruption when the current winding is at 99% or more.
- (3) If the spindle speed upon power recovery is within 2,000 rpm or less than 1/5 of Nmax (maximum speed).
- (4) Upon power re-interruption during recovery to normal operation.

It is possible to disable the normal resetting function if another device relating to the RX makes it undesirable.

In other words, it is possible to bring the RX to an unconditional stop upon detection of power interruption. Set as follows to enable or disable the normal operation resetting function:

Touch the [FUNCTION] icon on the top menu, and open the [INIT] – [SPEC] screen from the FUNCTION screen.



Switch to the [Power failure] page.

Set the continuance operating function.

Symbol:PDsw

Name:Continuance operation func.

Unit:—

Minimum:[ON]

Maximum:[OFF]

[ON] is selected as the default.

Power interruption is detected when the plant power voltage drops to below 87.5% of the nominal voltage. If power interruption is repeated frequently, a serious problem such as insufficient capacity exists on the plant power side.

Immediately check the cause and take an appropriate action without fail.

Possible causes of failure in stopping upon power interruption (yarn breaking at all spindles) are as follows:

- (1) Inverter INV1 abnormal
- (2) Backup capacitors C10, C11 (C12, C13) discharged

8.1A.3 Maintenance



⚠ WARNING

Be sure to observe the rules given in

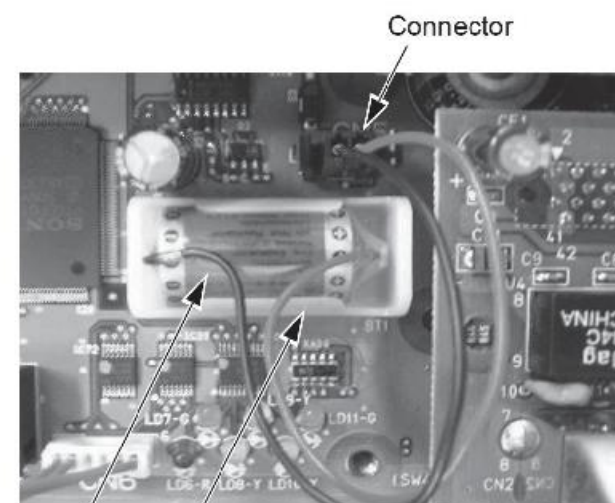
S.1 “Safe Work”

S.1.4 “Rules for Operating or Checking the Electrical Devices”

⚠ WARNING

- The authorized persons only should be allowed to carry out maintenance inspection and replace parts.
- Before starting the check procedure listed below, turn off the main circuit breaker and wait at least 10 minutes, and then check:
 - that the CHARGE lamp on the upper left of the control board is off.
 - that the DC voltage between pins P and N. It should be less than 45 V. An electrical shock could result.
- Take off watches, bracelets, and any other metal objects. Use insulated tools.
An electrical shock or bodily injury could result.

[1] Main Control Board Battery Replacement



The main control board is installed with a lithium battery for data backup at the time of power off or interruption. It should be replaced before expiry of its service life.

[1.1] Ratings

Model : ER3WK (thionyl chloride - lithium battery)

Nominal voltage : 3.6 V

Standard capacity : 910 mAh

Standard discharge current : 40 μ A

[1.2] Service life

If used under appropriate conditions: About 5 years

(Replacement at intervals of 3 years is desirable.)

[1.3] Replacement method

- (1) Turn the power off.
- (2) Disconnect the battery connector.
- (3) Extract the battery body from the holder.
- (4) Fit a new battery into the holder.
- (5) Connect the connector.

NOTE: If the battery is kept removed for a long time, the board data will be lost. Limit the time after disconnecting the old connector and connecting the new connector within 5 minutes. Since the battery will be discharged naturally if stored for a long period, it is recommended to order a new one before the replacement timing.

[2] Main Control Board Replacement

To replace the CPU board as the main control board, it is necessary to install the control program and select the RX specifications according to the instructions in Subsection 8.1A.3 [7] “Main Control Program Replacement”.

[3] Main Inverter Replacement

To replace the main inverter, make sure that the jumpers and DIP switches are set correctly beforehand. (Refer to Subsection 8.1A.1 [6.2](1)).

[4] Servo Amplifier Replacement

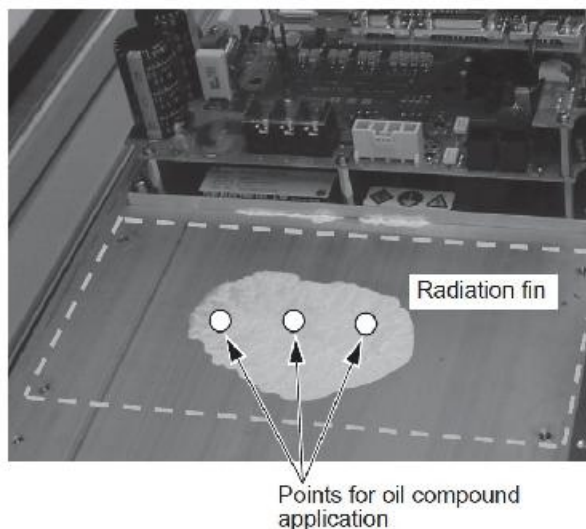
[4.1] Installed amplifier selection and DIP switch setting

Select the type of the amplifier to be replaced and set the DIP switches (Refer to Subsection 8.1A.1 [7.2](2)).

[4.2] Applying heat radiating oil compound

When replacing a servo amplifier, it is necessary to apply heat radiating oil compound on the mating surface between the servo amplifier aluminum base and the fin to maintain the servo amplifier heat radiation efficiency.

If operated without the oil compound, the amplifier temperature may rise excessively to cause a malfunction.

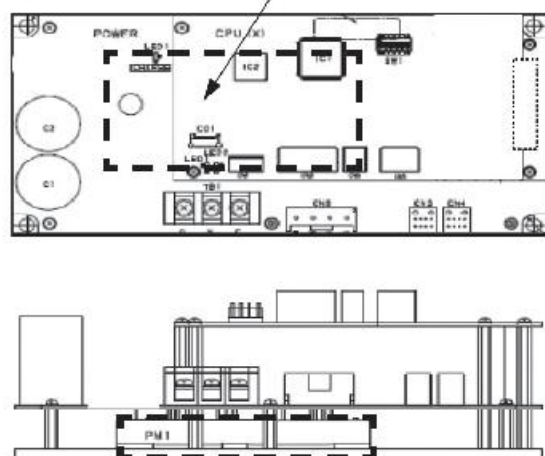


■ Application method

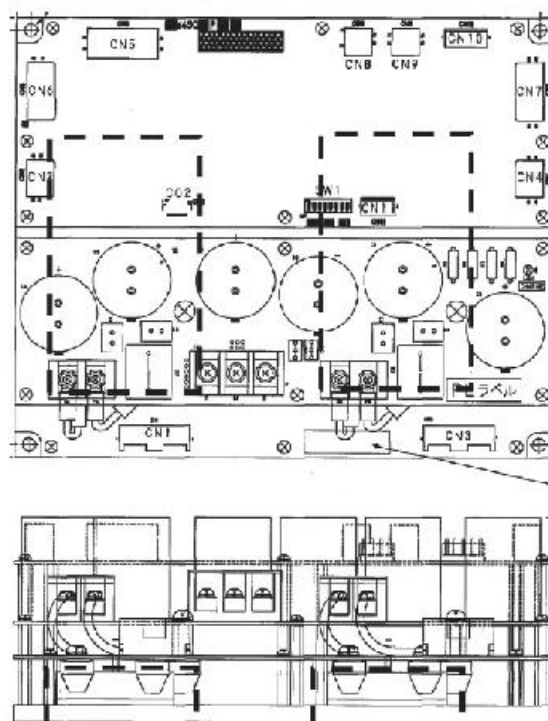
- (1) Remove the old amplifier to be replaced with a new one. Add oil compound with the old oil compound kept as it is.
- (2) Apply oil compound on the radiation fin where the servo amplifier IPM exists. Since the oil compound is naturally widened by contact with the amplifier, a small amount should be applied at each of the 3 points under the IPM as shown in the photo.
- (3) Place the new servo amplifier, and fix it by tightening the bolts.

Amplifier for 1 shaft

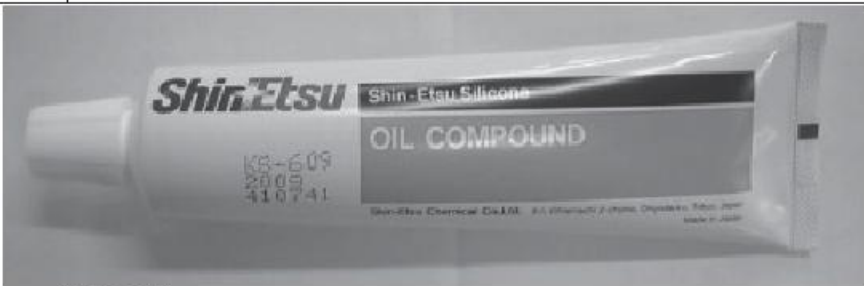
Application at three places
on the fin portion below.



Amplifier for 2 shaft



■ Recommended oil compound

Type :	KS-609
Product name :	Oil Compound (for heat radiation)
Manufacturer :	Shin-Etsu Chemical
Thermal conductivity :	0.75 W/m•K
	
Type :	YG6111
Product name :	Oil compound (for heat radiation)
Manufacturer :	GE Toshiba Silicone
Thermal conductivity :	0.84 W/m•K

NOTE: A product of another manufacturer may be used provided that it is for heat radiation from electrical devices and has a thermal conductivity of 0.75 W/m•K or more.

[5] Cooling Fan Life and Replacement

Cooling fans are provided near individual electrical devices.

Symbol	Use
M90	Heat radiation from inverter (INV1) and servo amplifiers (AMP1 to 9)
M91, 92	Cooling the internal atmosphere of control box
M93	Cooling the GE (ME) front roller motor (M15)
M94	Cooling the GE (ME) side middle roller motor (M16)
M95	Cooling the OE side middle roller motor (M17)
M96	Cooling the GE side front roller (M23)
M97	Cooling the GE side middle roller (M25)

The service life of the cooling fan motor bearing is 2 to 3 years. It is recommended to replace the cooling fans as complete assemblies with this period as the guideline.

[6] Electrolytic Capacitor Life and Replacement

It is recommended to replace the smoothing and backup capacitors (C10, C11(C12, C13)) of the main inverter (INV1) with spare parts every 5 years because of their life.

Replacement with spare capacitors stored for 3 years or more needs preparatory aging. Since this is difficult in a plant, it is recommended to order new capacitors before the replacement timing.

[7] Main Control Program Replacement

NOTE: Perform installation with the RX in stopped state.

[7.1] Program replacement procedure(In case of CPU board that has so farbeen operated)

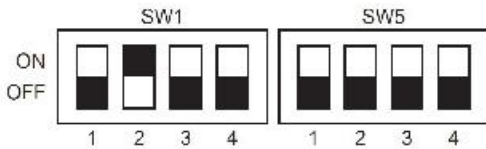


Fig. 1 DIP switches on CPU board

- (1) Save all data being used for back up in the USB memory.
- (2) Set bit 2 of the DIP switch SW1 on the CPU board to ON.
- (3) Set the 3-position key switch to the DATA-SET position, and insert the card containing the program.

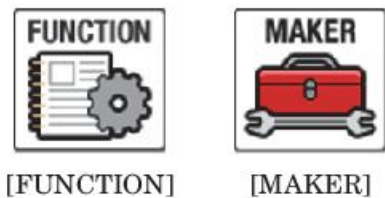


Fig. 2 Maker setting screen

- (4) Touch the [FUNCTION] icon on the top menu, and select the [MAKER] icon (maker setting) as a tool to display the maker setting screen.
- (5) Touch the [PROGRAM] switch to display the program-related menu screen (Fig. 3).

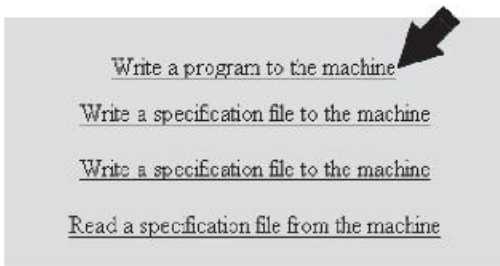


Fig. 3 Program-related menu screen

- (6) Touch the [Write a program to the machine] switch.



Fig. 4 Program selection screen (1)

Fig. 4 Program selection screen (1)

- (7) As the select program screen appears, touch [Browse...] switch.



Fig. 5 File selection window

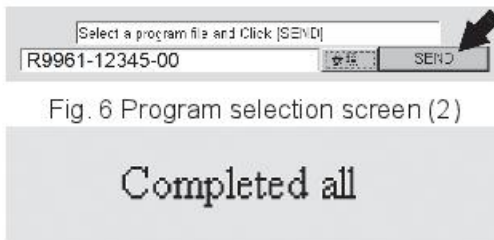


Fig. 6 Program selection screen (2)

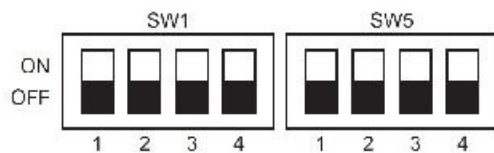


Fig. 7 Final DIP switch status (all OFF)

- (8) The file selection window will be displayed. Select a program or file to be changed and touch the [Open] button.

- (9) After checking that the program name in the box on the left side of the [Browse...] and [SEND] switches is correct, touch the [SEND] switch.

- (10) Program writing starts after a while. It takes about 2 minutes for writing.

- (11) When the message “Completed all” appears, turn the power supply OFF.

NOTE: Never try power off or RX operation during writing (while the writing percentage value is displayed). If the power is turned off, normal program operation fails.

- (12) Set bit 2 of DIP switch SW-1 to OFF, and turn the power supply on.

REFERENCE:

Automatic RAM clear occurs upon program replacement.

- (13) Load all backup data saved in step (1) from the USB memory.

- (14) After the end of sending, turn the power OFF once and turn it ON again.

NOTE: After making sure that the current ring rail height and doffer position pulse setting value are correct, start RX operation.

[8] Main Control Program Installation

[8.1] Program Installation Procedure(In case of new CPU Board (not containing program))

NOTE: Since the new CPU does not contain any program, the RX cannot be operated without loading the program. Installation using the USB memory which contains the master program is necessary.

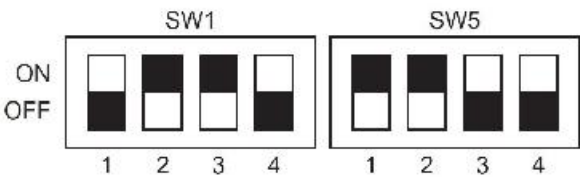


Fig. 1 DIP switches on cpu board

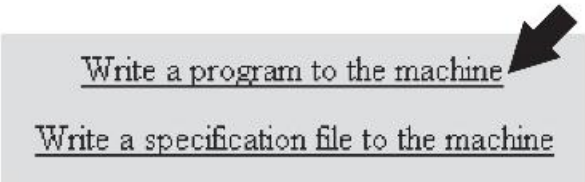


Fig. 2 Send program menu screen



Fig. 3 Program selection screen (1)



Fig. 4 File selection window

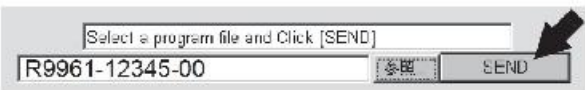


Fig. 5 Program selection screen (2)

- (1) Set bits 2 and 3 of DIP SW1 and bits 1 and 2 of DIP SW5 on the CPU board to the ON side.
- (2) Turn the power ON to display the send program menu screen, and touch [Write a program to the machine] switch.
- (3) As the program selection screen appears, touch the [Browse...] switch.
- (4) The file selection window will be displayed. Select a program or file to be changed and touch the [Open] button.
- (5) After checking that the program name in the box on the left side of the [Browse...] and [SEND] switches is correct, touch the [SEND] switch.
- (6) After a while, program writing starts. It takes about 2 minutes for writing.



Fig. 6 DIP switches on CPU board



Fig. 7 Machine specification selection screen

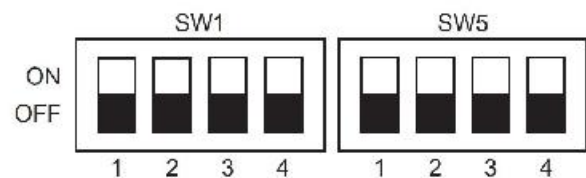


Fig. 8 Final DIP switch status (all OFF)

- (7) When the message “Completed all” appears, turn the power OFF.
- (8) Set all DIP switch bits other than SW1-bit 2 and SW5-bit 2 to OFF, and turn the power ON.
- (9) The machine specification selection screen appears.
Set the 3-position key switch to the DASTASET position.
Select the machine specifications correctly, and touch the [SET] switch.
- (10) After the end of setting machine specifications, set all DIP SW bits to OFF and turn the power on.

[9] Machine Specification Selection

IMPORTANT: It is necessary to set machine specifications before machine installation or replacement with a new board.

Setting not in agreement with machine specifications will fail in correct operation.

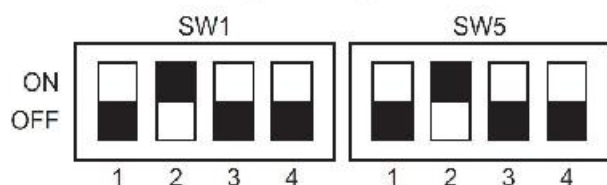


Fig. 1 DIP switches on CPU board

(1) Set DIP SW1-bit 2 and DIP SW5-bit 2 to ON.

(2) The machine specification selection screen appears upon power on.

Select the following specifications on this screen:

REFERENCE:

The display language can be selected by the [Language] switch at top right.



1. Lift
Select the machine lift.
[6 inch], [7 inch], [8 inch], [9 inch]
2. Nominal voltage
[380 V], [400 V], [415 V], [440 V], [460 V]
3. Main motor power
Spindle motor capacity
Induction motor : [37kw], [45kw], [55kw],
[65kw], [75kw], [90kw]
Energy-saving motor: [ESM65kw] [ESM85kw]
4. Spindle wharve dia
Spindle wharve diameter
[18.5], [19.0], [20.2], [23.8] (Unit: mm)
5. Roller dia (FR/MR/BR)
Select the combination of draft roller (front roller/ middle roller/back roller) shaft diameters.
[27.0/27.0/27.0][30.0/30.0/30.0]
[28.5/27.0/28.5][30.0/27.0/30.0]
[27.0/30.0/27.0] (Unit: mm)
6. Draft type
[Short] : 2-head frames without OE auxiliary gearing
[Long] : 2-head frames with OE auxiliary gearing
[ExLong] : 3-head frames
7. Blow cleaner
Blow cleaner control
[Internal] : Control by RX
[Group] : Group control by RX
[Other] : Control by blow cleaner manufacturer

8. Compact
 - [Without] : Without compact device
 - [Type 2A]: With compact device
(Type 2 middle slit type)
 - [Type 3]: With compact device
(Type 3)
 - [Type 3S]: With compact device
(Type 3 with middle part sensor)
9. Direction of twist
 - [Z] : Other than S&Z twist specification.
 - [S&Z] : Both S-twist and Z-twist
10. Bottom apron
 - Select the bottom apron thickness.
 - [1.0], [1.1], [1.2], [1.27] (Unit: mm)
11. Spindle brake
 - Select the spindle brake operation method.
 - (Knee brake or hand brake)
 - [Knee] : Knee type spindle brake
 - [Finger] : Hand type spindle brake
12. SCD-Winder
 - [Without] : Without SCD specification
 - [Murata] : With SCD, Murata winder link
specification
 - [Schlafost]: With SCD, Schlafost winder link
specification
 - [Savio] : With SCD specification, Savio
winder link specification
 - [TBC] : With SCD, Toyota TBC specification
13. Tray dir
 - Select the tray conveying direction.
 - [R->L(4)] : Clockwise, feeding 4 trays per cycle
 - [L->R(4)] : Counterclockwise, feeding 4 trays
per cycle
14. TBC PH51
 - Select whether the TBC hopper has the PH51
sensor inside.
 - [Without] : Not designed to have PH51
 - [With] : Designed to have PH51
15. TBC PH52
 - Select whether the TBC upper shooter has
the PH52 sensor.
 - [Without] : Not designed to have PH52
 - [With] : Designed to have PH52
16. Pneumatic clearer
 - [NORMAL] : Pneumatic clearer motor utility
power drive
 - [INV] : Pneumatic clearer inverter drive

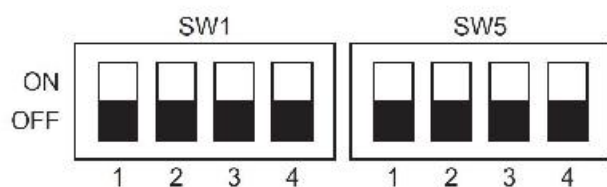


Fig. 3 Final DIP switch status (all OFF)

- (3) Set the 3-position key switch to the DATA-SET position.
- (4) Select the machine specifications correctly, and touch the [SET] switch displayed in the bottom right portion on the screen.
- (5) Touch [YES] on the confirmation screen to register the machine specifications.

REFERENCE:

Since the contents set on this screen are registered in the flash memory on the CPU board, they are not cleared upon RAM clear at the time of program replacement.

- (6) After setting all machine specifications, turn the power off, set all DIP switches to OFF, and turn the power on again.

REFERENCE:

The machine specifications may be referenced on the Help screen aside from the machine specification selection screen (Fig. 2).

Touch the [?] icon  on the right side of the top menu to display the help screen.

After changing settings, make sure that all settings are correct.

[10] RAM Clear

RAM clear means to initialize the set values and control data stored on the CPU board.

RAM clear occurs automatically upon ordinary program change but it can also be done manually.

Since the control data is initialized upon RAM clear, it is necessary to repeat ring rail zero pint setting and SCD doffer home position setting.

[10.1] RAM clear procedure

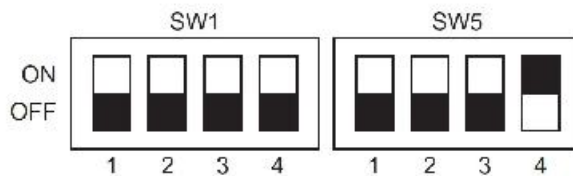


Fig. 1 DIP switches on CPU board

- (1) Set bit 4 of DIP SW 5 on the CPU board to ON.
(RAM clear protect cancellation)

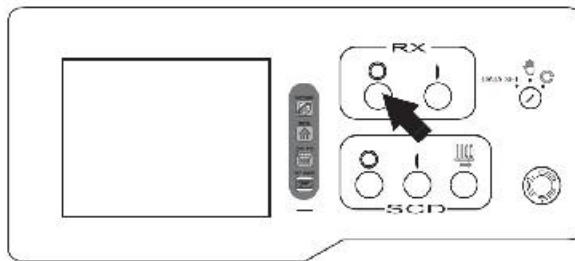


Fig. 2 RX stop switch

- (2) With the RX stop switch kept pressed, turn the power ON.
Keep the switch pressed until the HOME screen appears on the function panel.
“RAM clear” message appears on the screen.

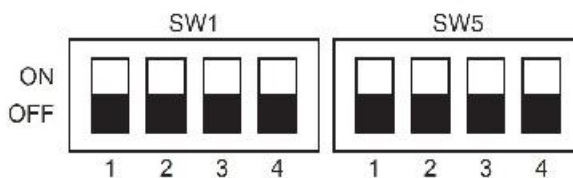


Fig. 3 Final DIP switch status (all OFF)

- (3) Turn the power off and set all bits of DIP switches on the CPU board to OFF.
(For protection from RAM clear)

[10.2] Resetting procedure

After RAM clear, redo all settings such as ring rail and doffer origin adjustments according to the following procedure:

- (1) Turn the power on.
- (2) Upon system startup with HOME screen display, input all settings.
- (3) Set the zero point for the ring rail.
- (4) Set the SCD doffering bar basic position.
- (5) Make fine adjustment of each doffering bar position.

REFERENCE:

If all setting values and control data are stored on the USB memory, data for steps (3), (4) and (5) can all be restored from the USB memory.

8.1A.4 Cleaning and Inspection at Periodic Maintenance

[1] General

Item	Maintenance	Interval
1. Cleaning	Clear fleece or fly with a vacuum cleaner from the following: • Inside of the OE control box • Cooling fan cover of each motor • Meshes at the vents of the cooling fans	Every 3 months
		Every doffing operation
2. Inverters	Perform the maintenance, by referring to the “Maintenance details for the inverters” given on the next page.	Daily and every 3 months
3. Rotation of fan motors	• Turn off the power and turn the fans by hand to check whether they rotate smoothly. • Check for abnormal noise when the fan motors are in rotation.	Every 6 months
4. Looseness of terminals	• Visually check that the terminal boards of the power circuitry are not discolored partially due to heat generated by looseness of screws. • Check with a screwdriver that the screws on the terminal pins are not loose.	Every year
5. Looseness of connectors	Check that the connectors are firmly plugged in the following:	Every year
	• Main control board	

[2] Inverter and Servo Amplifiers



⚠ WARNING

- The authorized persons only should be allowed to carry out maintenance inspection and replace parts.
- Before starting the check procedure listed below, turn off the main circuit breaker and wait at least 10 minutes, and then check:
 - that the CHARGE lamp on the upper left of the control board is off.
 - that the DC voltage between pins P and N. It should be less than 45 V. An electrical shock could result.
- Take off watches, bracelets, and any other metal objects. Use insulated tools.
An electrical shock or bodily injury could result.

NOTE: For details, refer to the inverter manufacturer's instruction manual delivered with the RX.

Item	Description	Cycle
1 Power supply and load	• Motor speed check • Power voltage check • Output frequency, voltage and current	Daily
2 Abnormal noise	Check the inverter, servo amplifier and motor for any abnormal noise.	
3 Temperature or humidity abnormality	• Inverter and servo amplifier temperature rise • ***** • *****	
4 Oil existence check	Hasn't oil entered the control box? Hasn't oil entered the inverter unit?	
5 Heat radiation fin	Check the fin portion for any clogging with dust or fly, and blow compressed air for cleaning.	Every month
6 Terminals and connectors	Is there any loosened terminal or connector?	Every 3 months
7 Vent hole	Check any dust or dirt accumulation.	
8 Printer circuit board and main circuit	Fly or dust suction	

8.1A.5 Centralized Cleaning System Interface Signals(Required for Travelling Cleaners Prepared by Customers)

If you want to prepare and set up a travelling cleaner by yourself for using it together with the centralized cleaning system, you need to program the timing sequence of the centralized cleaning signals, travelling cleaner control signals and other related signals as follows:

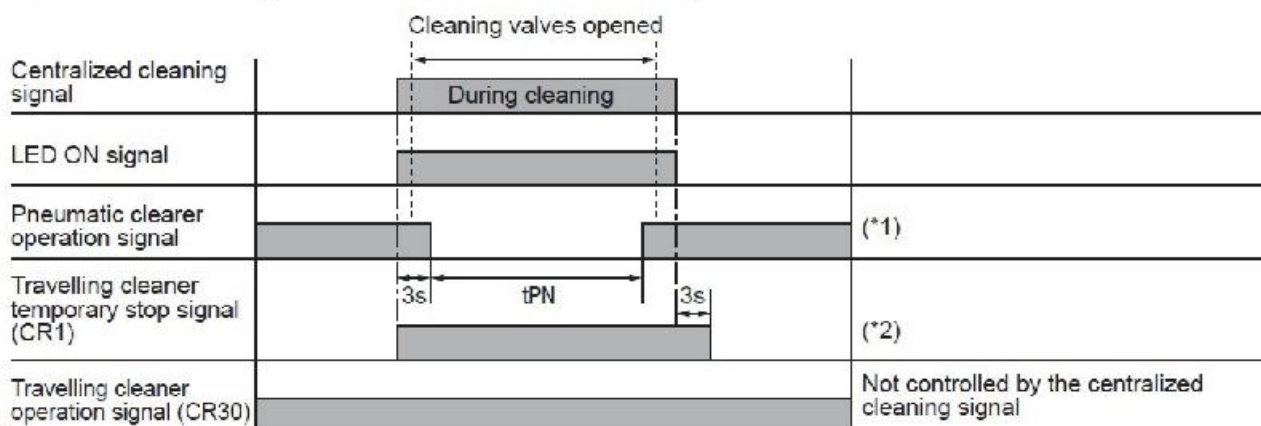
- (1) Centralized cleaning signals should be periodically issued to individual RXs in order.
- (2) When a centralized cleaning signal is High, the travelling cleaner should be on halt. After three seconds from the signal going Low, the travelling cleaner should start operating.
- (3) Upon receipt of a retraction signal sent from the RX, the travelling cleaner should stop in the retraction place.

For the above signal control, TOYOTA may provide relays in the control box.

REFERENCE:

If you purchase RXs that are already set up with travelling cleaners in TOYOTA, only item (1) above is what you need to set up.

■ Centralized cleaning and travelling cleaner control timing scheme



(*1) Only when the cleaning valves are opened (only during actual cleaning), the pneumatic clearer should be on halt.

You may set the stop time length.

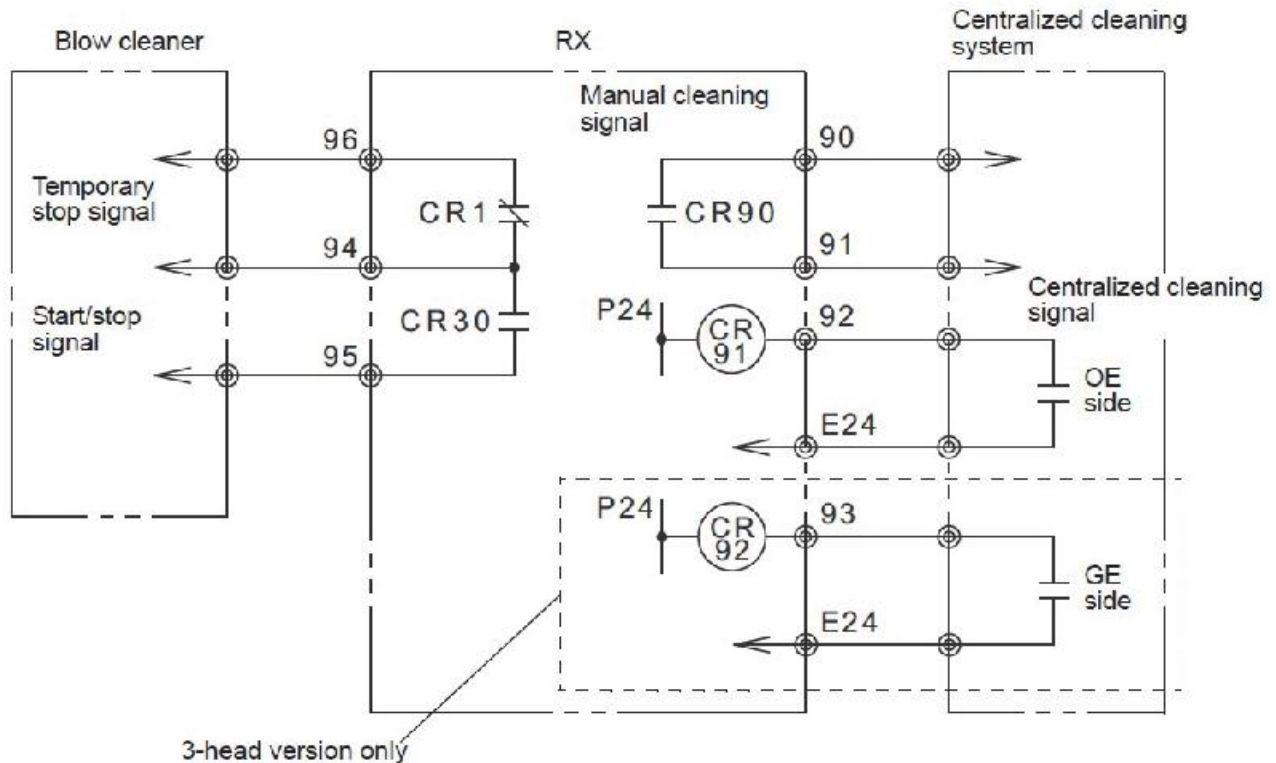
If the centralized cleaning signal is turned ON when the pneumatic clearer is in operation, the pneumatic clearer should stop three seconds later.

After the preset “tPN” seconds (initial value: 10 seconds, entry range: 0 to 20 seconds) from the stop of pneumatic clearer, the pneumatic clearer should start again. (If the centralized cleaning signal is turned OFF when the pneumatic clearer is on halt, the pneumatic clearer should start immediately.

(*2) If the centralized cleaning signal is turned ON when the travelling cleaner is in operation, the travelling cleaner should stop immediately.

If the centralized cleaning signal is turned OFF when the travelling cleaner is on halt, the travelling cleaner should start again three seconds later.

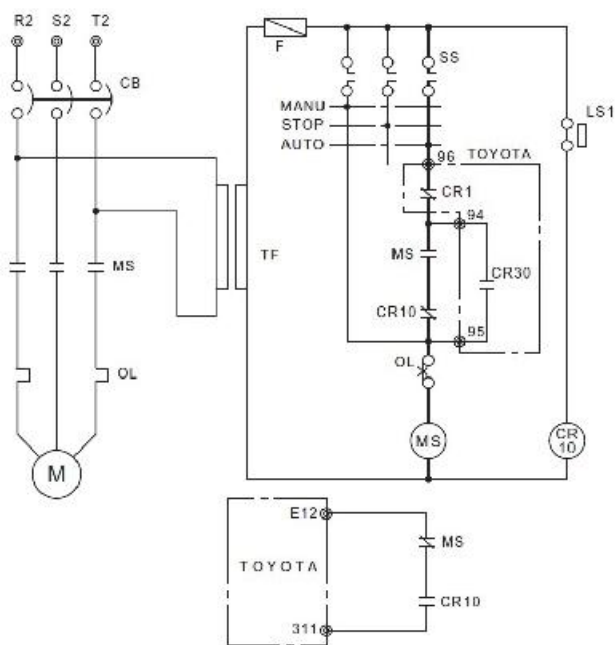
■ Interface for travelling cleaner and centralized cleaning system



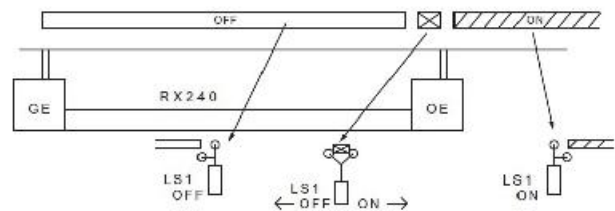
Signal name	Signal direction	Function
Manual cleaning signal (CR90)	RX ↓ Cleaning system	Setting the manual cleaning switch on or off on the RX operation panel will turn this manual cleaning signal on (close) or off (open), respectively. When this signal is ON, the cleaning system should operate; when OFF, it should stop.
Centralized cleaning signal (to be prepared by the customer)	Cleaning system ↓ RX	When the cleaning system is in operation, this signal should be ON (close). Upon receipt of this signal, the RX stops the pneumatic clearer. On 3-head frames, prepare this signal for both OE and GE sides since the pneumatic clearer is located at OE and GE sides separately.
Start/stop signal (CR30)	RX → Travelling cleaner	When the RX starts operation, the CR30 goes ON so that the travelling cleaner starts running. If the CR30 goes OFF, the travelling cleaner stops in the retraction place.
Temporary stop signal (CR1)	RX → Travelling cleaner	If the CR1 goes ON (if the contact is opened), the travelling cleaner stops immediately.

(Example) Control circuitry with the centralized cleaning system

The control circuitry should be provided by the manufacturer of the travelling cleaner.



Limit switch status (when the travelling cleaner is in the OE retraction place)



9.1A Troubleshooting

Contents

9.1A.1	Troubleshooting	9.1KE-1
9.1A.2	List of Error Messages	9.1KE-3
9.1A.3	List of Error Messages about Servo Amplifier	9.1KE-18

9.1A.1 Troubleshooting



⚠ CAUTION

During troubleshooting, be sure to observe the precautions given in

- S.1 “Safe Work”
- S.1.2 “Rules for Safe Operation”
- S.1.3 “Rules for Maintenance”
- S.1.4 “Rules for Operating or Checking the Electrical Devices”

The messages that the RX can show on the operation panel are divided into the classes given in the table below.

If any message appears, check the contents and take necessary actions.

Class	Contents	Resetting for operation
E- **	• Trouble in operation causing frame stop • Trouble in stopped state not related to the operator	Resetting after corrective action needed
W- **	• Trouble in operation not causing frame stop • Trouble in stopped state related to the operator	Resetting after corrective action needed
INV1- **	• Trouble related to main motor inverter	Resetting after corrective action needed
INV7- **	• Trouble related to SCD doffing motor inverter (only on frame with SCD specification)	Resetting after corrective action needed
INV8- **	• Trouble related to compact motor inverter (only on frame with compact device)	Resetting after corrective action needed
INV9- **	• Trouble related to pneumatic motor inverter (RX with the energy-saving pneumatic device only)	Resetting after corrective action needed
AMP1 to 9- **	• Trouble related to draft roller and lift-driving servomotor/amplifier * Concerning the relationship between driving shafts and amplifier numbers, see the table below.	Resetting after corrective action needed
M- **	• Failure in operation because of disagreement of conditions upon operator's operation	No need of resetting (The message disappears automatically.) REFERENCE: Some message may require an action. Since the number is the same as for E- and W-, refer to the respective action.
Text only (no symbol)	• Message upon operating panel operation or setting • Frame status message	No action needed. (The message disappears automatically.)

NOTE: Messages (E-, W-, INV-, AMP-) corresponding to the found troubles will be registered to trouble log automatically.

The history of occurred troubles can be referred to message display screen under maintenance mode. (access method:click [MAINTEN] icon to reach [MESSAGE] icon)

NOTE: For some of E- **, W- **, the corresponding Explanation and Action to be Taken can be shown on the machine. (“The List of Troubles” on help display screen)

Driving shaft and amplifier No. relationship table

	2-head frame (No auxiliary gearing)	2-head frame (With auxiliary gearing)	3-head frame
Front roller (GE-driving)	AMP1	AMP1	AMP1-2
Front roller (MH-driving)	-	-	AMP1-1
Middle roller (GE-driving)	AMP2	AMP2-1	AMP9
Middle roller (MH-driving)	-	-	AMP2-1
Middle roller (OE-driving)	-	AMP2-2	AMP2-2
Back roller (GE-driving)	AMP3	AMP3-1	AMP8
Back roller (MH-driving)	-	-	AMP3-1
Back roller (OE-driving)	-	AMP3-2	AMP3-2
Ring rail	AMP4	AMP4	AMP4

9.1A.2 List of Error Messages

CAUTION

When taking any of the error recovery actions listed below, be sure to observe the precautions given in

S.1 “Safe Work”

S.1.2 “Rules for Safe Operation”

S.1.3 “Rules for Maintenance”

S.1.4 “Rules for Operating or Checking the Electrical Devices”

Error Messages	Related Machine	Explanation	Actions to be Taken
E-1A Stop by Power Interruption (Deisable continuous operation)	RX	[Disable] is selected for continuous operating function. The power is not supplied. Low power supply voltage. Lack of power supply phase. Occurrence of power interruption for 6 ms or more.	Keep the main breaker off until the power supply becomes normal. If this occurs while the power supply is normal: 1 Check the power supply cable for continuity and no defective contact. 2 Replace the inverter board. 3 Replace the I/O board and CPU board.
W-1A Occurrence of Momentary Power Interruption	RX	Power recovery operation by the machine after detection of power interruption.	If occurs frequently, check the plant power supply. 1 Existence of any place struck by lightning around the plant 2 Existence of any momentary interruption in the power route 3 Lacking phase 4 Is any heavy electric machine near the ring frame?
E-1B Ring Frame Stop Due to Power Interruption (Long power interruption)	RX	The ring frame is stopped due to detection of power interruption over 2 seconds.	Check the cause of interruption on the plant power supply side. 1 Any interruption in the power line? 2 Lacking phase 3 Is any heavy electric machine near the ring frame? If any power interruption occurs while the power supply is normal: 1 Check and clean any cotton or other dust at the contact of contactor MS11. 2 Check for any loosening of the wiring of MS11, INV1, and PCB2.
E-1C Ring Frame Stop Due to Power Interruption (Recurrence of momentary power interruption)	RX	The ring frame was stopped due to re-detection of power interruption immediately after power recovery.	Check the cause of interruption on the plant power supply side. 1 Any interruption in the power line? 2 Lacking phase 3 Is any heavy electric machine near the ring frame? If any power interruption occurs while the power supply is normal: 1 Check and clean any cotton or other dust at the contact of contactor MS11. 2 Check for any loosening of the wiring of MS11, INV1, and PCB2.

9.1A.2 List of Error Messages

Error Messages	Related Machine	Explanation	Actions to be Taken
E-1D Ring Frame Stop Due to Power Interruption (Occurrence of power interruption upon reacceleration)	RX	The ring frame was stopped due to redetection of power interruption during rpm recovery after power recovery.	Check the cause of interruption on the plant power supply side. 1 Any interruption in the power line? 2 Lacking phase 3 Is any heavy electric machine near the ring frame? If any power interruption occurs while the power supply is normal: 1 Check and clean any cotton or other dust at the contact of contactor MS11. 2 Check for any loosening of the wiring of MS11, INV1, and PCB2.
E-1E Ring Frame Stop Due to Power Interruption (Power recovery operation not possible)	RX	The ring frame was stopped due to dissatisfaction of the power recovery conditions after a momentary power interruption. <Conditions disabling recovery> • Winding on bobbin is 99% or more. • The rpm is below the specified level. • Another error occurred.	
E-1F SCD and Tray Stop Due to Power Interruption	RX	The machine was stopped due to detection of power interruption exceeding 2 seconds during SCD or tray operation.	Check the cause of interruption on the plant power supply side. 1 Any interruption in the power line? 2 Lacking phase 3 Is any heavy electric machine near the ring frame? If any power interruption occurs while the power supply is normal: 1 Check and clean any cotton or other dust at the contact of contactor MS11. 2 Check for any loosening of the wiring of MS11, INV1, and PCB2.
E-2A Ringrail Over Upper	RX	The ring rail has exceeded the upper limit. (The PRS1 has gone OFF.)	1 Check whether a sensor (PRS1) and bracket adjustment are proper. 2 Check whether there are failure of a sensor, and disconnection of a line and the slack of a terminal stand. 3 Turn off the power, and lower the ring rail to the proper position by turning the manual lifting handle, and adjust Ringrail Pos. to Zero. 4 Go up and down a ring rail manually, and check whether it operates normally. If the machine doesn't operate normally, please replace the CPU board, I/O board, servo amplifier and servo motor.

Error Messages	Related Machine	Explanation	Actions to be Taken															
E-2B Ringrail Over Lower	RX	The ring rail has dropped down below the lower limit. (The PRS1 has gone OFF.)	1 Check whether a sensor (PRS1) and bracket adjustment are proper. 2 Check whether there are failure of a sensor, and disconnection of a line and the slack of a terminal stand. 3 Turn off the power, and lift the ring rail to the proper position by turning the manual lifting handle, and adjust Ringrail Pos. to Zero. 4 Go up and down a ring rail manually, and check whether it operates normally. If the machine doesn't operates normally, please replace the CPU board, I/O board, servo amplifier and servo motor.															
E-4 Motor Temperature	RX	The thermal relay of a pneuma motor (M70, M71) or the cooling fan motor (M90) integrated thermal switch is activated.	1 When The thermal relay (OL70, 71) of a pneuma motor is tripped, check the drive system of a pneuma motor. 2 When The thermal relay (OL70, 71) is not tripped, check the drive system of a cooling fan motor.															
E-8A Emergency PB ON or Door Open	RX	The emergency stop button was pressed (and locked). Or any of the doors on the OE and GE control boxes is open.	1 Remove the cause of the emergency stop and then turn the emergency stop button clockwise to unlock. 2 Check whether all the control box doors (one at the GE and two at the OE) are closed tightly. 3 When there is a wire switch, please check whether it is operating unusually.															
E-9 Pneumatic inverter pressure sensor is abnormal.	Pneumatic INV	Pneumatic inverter pressure cannot be detected normally.	1 Check the pressure sensor wiring. 2 When the pressure cannot be detected frequently, replace the pressure sensor.															
W-9B Excessive accumulation of pneumatic box fry or fleece	Pneumatic INV	The amount of fly or fleece in the pneumatic box exceeds the warning level.	Remove the fly or fleece inside the pneumatic box.															
W-9C Pneumatic teaching is incomplete.	Pneumatic INV	The pneumatic teaching operation is incomplete.	After removing the fly or fleece inside the pneumatic box, carry out the pneumatic teaching operation.															
E-10 Full Bobbin	RX	The RX cannot run because it has full bobbins.	Check that the doffing is completed, then reset the production length counter to zero.															
E-11 Lifting or In Calculation	RX	The Start switch was pressed while the lifting bar was running or the controller was executing calculations.	Wait a few seconds, then press the Reset switch.															
E-13A Lappet Position is Abnormal	RX	The RX cannot run because the lappets are not in place at the proper angle.	Check the OE sensors (PRS2TR and PRS2TL) and the GE sensors (PRS2TRA and PRS2TLA:three-head machine only). <table><tr><td></td><td>PRS2TR</td><td>PRS2TL</td><td>PRS2TRA</td><td>PRS2TLA</td></tr><tr><td>When lappets are turned up</td><td>OFF</td><td>ON</td><td>ON</td><td>ON</td></tr><tr><td>When lappets are horizontal</td><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td></tr></table>		PRS2TR	PRS2TL	PRS2TRA	PRS2TLA	When lappets are turned up	OFF	ON	ON	ON	When lappets are horizontal	ON	OFF	OFF	OFF
	PRS2TR	PRS2TL	PRS2TRA	PRS2TLA														
When lappets are turned up	OFF	ON	ON	ON														
When lappets are horizontal	ON	OFF	OFF	OFF														

9.1A.2 List of Error Messages

Error Messages	Related Machine	Explanation	Actions to be Taken
E-13D Lappet Driving Delay	RX	The lappet drive mechanism is faulty. (Lappet turning-up motor overtime)	1 Check in the state where a lappet cylinder can operate. 2 Check whether the OE lappet sensors (PRS2TR and PRS2TL) and the GE sensors (PRS2TRA and PRS2TLA: three-head machine only) are turned ON/OFF normally.
E-16B Ringrail Position was Changed	RX	The zero point of the ring rail is incorrect. Or the ring rail position sensor PRS8 is not adjusted correctly.	1 Check that the PRS8 is adjusted correctly. 2 Check that the currently displayed position of the ring rail matches the actual position. If it does not, make zero point setting. No zero point of the ring rail has been set, so the RX cannot run. Set the zero point of the ring rail.
W-16C Ringrail Pos. is not Set to Zero	RX	The RX cannot run because the Ringrail Pos. is not Set to Zero.	Set the Ringrail Pos. to be Zero.
E-16D Lifting Motion is Abnormal	RX	The difference of the actual amount of movements of a ring rail and the instructions is over the regulations.	1 Check whether there are any abnormalities in a ring rail drive system. 2 Check whether there are any abnormalities in wiring between servo amplifier and an I/O board.
E-17 CPU was Reset	RX	The CPU board is reset during RX operation.	1 Check if any additional wiring is placed near the 5 V line wiring (P5 - E5) connected to the CPU board. (a) Is there any cable which is likely to make a noise in the same duct? (b) Is there any cable which is likely to make a noise near the 5 V line? 2 Confirm whether the voltage between P5 and E5 of a power supply PCB2 is normal and please adjust volume. 3 If this error occurs frequently, replace the CPU board with a new one.
E-18 Spindle Speed is Abnormal	RX	The measured spindle speed (rpm) differs from the set speed by 5% or more.	1 Adjust and check the spindle speed detection sensor (PRS5). 2 Check if the main motor belt is not damaged and the tension is appropriate. 3 Check a setup (NMAX) of the spindle max speed. 4 Check the settings for the motor pulley and the drive pulley.
W-19 Twist is faulty	RX	The measured number of twists differs by 5% or more from the schedule twists (computes from the setting value TW).	1 Adjust the front roller speed sensor (PRS4) 2 Check if the main motor belt is not damaged and the tension is appropriate. 3 Adjust the tin pulley shaft rotation sensor (PRS5). 4 Check the set value RF (front roller diameter) and the Tw (number of twists). 5 Check the twist change gear and twist constant gear.
E-20 SCD State is Abnormal	DOF	The RX cannot run because the doffing bar stays in the closing position above the spindles.	Move the doffing bar from the closing position above the spindles to any other position.

Error Messages	Related Machine	Explanation	Actions to be Taken
E-40-*** Block ** compact motor overload	Compact	Operation of the thermal relay for block ** suction motor	Check and correct the cause of abnormality. • Isn't the impeller clogged with fly and fleece? • Check the motor shaft for smooth rotation. • Check the motor wiring for any loosening.
E-42-*** Block ** suction power abnormality (condense side)	Compact	Block ** suction power abnormality (clogging generation in condense zone)	Check the suction piping (especially the condense zone) for any clogging with fly and fleece, and correct it.
E-43-*** Block ** suction power abnormality (blower side)	Compact	Block ** suction power abnormality (clogging generation in blower)	Check the suction piping and blower for any clogging with fly and fleece, and correct it. Check the blower for normal revolution.
W-44 Average compact suction power abnormality	Compact	Overall pressure drop in the frame	Overall frame piping may be clogged with fly and fleece. Conduct maintenance.
E-45 Block ** excessive suction power fluctuation	Compact	Much suction power fluctuation in block **	Check the piping for any clogging with fly and fleece, and take the corrective action. Also check the blower for smooth revolution.
W-46-*** No. ** Compact IF board terminal setting error	Compact	The settings for the board switches are wrong.	Concerning the four DIP switches on each board inside each relevant joint box, normally, DIP switches in GE-terminal boxes are ON and those in other boxes are OFF. This needs to be checked.
W-47-*** No. ** Compact IF board communication wire failure	Compact	A communication error has occurred on the compact board.	• Check whether the board wires are disconnected, loosened, or damaged. • Check whether there is any noise generation source around the board. • Replace the compact board with a reserved one.
E-52A Doff. Bar Went Over Limit (PRS21)	DOF	The bar overrun safety sensor (PRS21) in the closing position was activated.	1 Check the position of safety sensor and adjust it if necessary. 2 Check the drive mechanism and control circuitry. (a) Is the brake gap of the doffing motor proper? (b) Is the factory's voltage regulation within the proper range?
E-52B Doff.Bar Went Over Limit (PRS22)	DOF	There is a height difference between the RH and LH sides of the doffing bar.	1 Check the tension of the timing belt. If the belt is loose, adjust it. 2 Check that fibers are not entangled in the timing belt mechanism. Clean the timing belt and its surroundings. Adjust the timing belt tension again. 3 Check the mounting position of the PRS22. 4 After completion of adjustment and check, please perform PRS22 clear operation on an initial-setting screen.
E-52C Doffing bar PA stop error (With pulse change)	DOF	The doffer did not stop moving at the PA position.	1 Check if the SCD stopper is mounted incorrectly. 2 Check the encoder function and harness disconnection.
E-52D Doffing bar PA stop error (PA position error)	DOF	After the doffer brake was released, the doffer stopped at a position above PA.	1 Check if the SCD stopper is mounted incorrectly. 2 Check the encoder function and harness disconnection.

9.1A.2 List of Error Messages

Error Messages	Related Machine	Explanation	Actions to be Taken															
E-54 Doffing Bar Open-Close is Delay	DOF	The opening or closing speed of the doffing bar is too low. (It required more than 20 seconds to complete opening or closing.)	1 Check the air pressure. 2 Check if there is any obstruction to the doffing bar travel. 3 Adjust the speed controller so that the sequence of the air cylinder operation will complete in 4 to 5 seconds (typical).															
E-57 Dof.SW (PRS10, 11) is Abnormal	DOF	Both proximity switches PRS10 and PRS11 are OFF.	1 Check the opening/closing position of the doffing bar. 2 Check the wiring of these switches. Replace them if necessary															
E-57A Dof. SW State (PRS3) is Abnormal	DOF	Even five seconds after the intermediate stopper solenoid was turned to the OUT position, the PRS3 was not turned ON. Even five seconds after the intermediate stopper solenoid was turned to the IN position, the PRS3 was not turned OFF.	1 Check the air pressure. 2 Check the movement of the intermediate stopper. 3 Adjust the PRS3 so that it turns on when the intermediate stopper is out.															
E-58B Doffer Interlocked Lappet	DOF	The SCD has received no tiltedlappets confirmation signal, so the SCD cannot start.	1 Check at both RH and LH sides if the lappets have been completely tilted up. 2 Check if the OE sensors on both RH and LH sides are ON when the lappets are turned up.															
E-58C Doffer Interlocked B.C	DOF	The blow cleaner is not placed in the retracted position (the retraction completion LS31 is not ON), so the SCD cannot start.	1 Move the blow cleaner to the retracted position. 2 Check the LS31. NOTE: To start the SCD automatically after the blow cleaner has retracted, modify the set value DS.															
E-58E Doffer Interlocked Side Frame	DOF	The SCD is disabled for safety if any SCD on the adjacent RX frame is running.	1 Wait for the SCD on the adjacent RX frames to stop running. 2 If the SCD on the adjacent RX frame is in the storage position, check the following: (a) Is CR25 on the adjacent frame OFF? (b) No input error or disconnected wiring?															
E-58G Doffer Drivenby Manual Operation	DOF	The 3-position key switch is set to the Manual position.	1 Turn the 3-position key switch to the Automatic position. 2 Press the Reset button and then press the SCD start switch.															
E-58I Doffing Bar is Out of Starting Pos.	DOF	At the time of interlock operation, the doffing bar was not in the storage position.	1 Move the doffing bar to the storage position in manual operation. 2 After the above operation, check that the bar is stopped between the PC and PD positions.															
E-60C Feeding Motion isn't Complete	TRAY	The trays have not completed emptybobbin unloading, so the SCD cannot start.	1 For the trays, continue the operation until end of tray feeding. NOTE: After this operation, modify the setting value of DS, if you want to operate the SCD automatically. 2 Check that tray sylinder is on the feeding position.															
E-60F Base Tray Pos. is not Initial	TRAY	The tray cylinders are neither in the feeding position nor retracted position.	Adjust the sensors so that each of them runs as listed below. (Counterclockwise) <table><tr><td></td><td>PRS46A</td><td>PRS46B</td><td>PRS48A</td><td>PRS48B</td></tr><tr><td>Feeding position</td><td>OFF</td><td>ON</td><td>ON</td><td>OFF</td></tr><tr><td>Retracted position</td><td>ON</td><td>OFF</td><td>OFF</td><td>ON</td></tr></table>		PRS46A	PRS46B	PRS48A	PRS48B	Feeding position	OFF	ON	ON	OFF	Retracted position	ON	OFF	OFF	ON
	PRS46A	PRS46B	PRS48A	PRS48B														
Feeding position	OFF	ON	ON	OFF														
Retracted position	ON	OFF	OFF	ON														

Error Messages	Related Machine	Explanation	Actions to be Taken
E-61E Tray position is abnormal (PH60).	TRAY	The tray position sensor (PH60) is not turned OFF.	1 Check the tray position. 2 Check if the trays can be carried in smoothly. 3 Check the tray position sensor (PH60) for its functioning and the cable for any discontinuity.
E-61F Tray position is abnormal (PH60).	TRAY (TBC)	The tray sensor (PH60) on the forward side is not turned OFF. (Tray loading error).	1 Adjust the sensor (PH60) position. 2 Check the pushing pressure of the TBC turntable. 3 Check that trays without bobbins are not carried in. 4 Check the sensor for any defect and its cable for any discontinuity.
E-62A Tray CY1 Clogged	TRAY	Since the tray cylinder in right side did not complete its operation within the specified time, the RX resulted in emergency stop. (Specified time length: Fixed to 10 sec.)	1 The tray loading cylinder receives a faulty load. (a) Check if the trays can be moved smoothly. (b) Check if there is no fly or dust clog on the tray rail. 2 Check if the air pressure has not dropped abnormally or if the cylinder speed is proper.
E-62B Tray CY2 Clogged	TRAY	Since the tray cylinder in left side did not complete its operation within the specified time, the RX resulted in emergency stop. (Specified time length: Fixed to 10 sec.)	1 The tray loading cylinder receives a faulty load. (a) Check if the trays can be moved smoothly. (b) Check if there is no fly or dust clog on the tray rail. 2 Check if the air pressure has not dropped abnormally or if the cylinder speed is proper.
E-62C Clogged tray (OE: PH61)	TRAY	No tray was detected within the specified time. (PH61) (Clogged tray on unloading side.)	1 Check for no tray displacement or clogging on the tray outlet portion. 2 Check that the cylinder is in the return position and correct the tray position. (Fully in the loom.)
E-62D Clogged tray (GE: PH62)	TRAY	No tray detection within the specified time. (PH62) (Clogged tray on loading side.)	1 Check for no tray displacement or clogging on the GE turning portion. 2 Check that the cylinder is in the return position and correct the tray position. (Fully in the loom.)
E-63A Entrance of tray without bobbin. (PH60)	TRAY	PH60 failed in detecting four bobbins upon tray loading. (Entrance of tray without bobbin)	1 If no tray exists on the tray at the inlet, place a bobbin on the tray. 2 If the tray at the inlet is displaced, adjust the tray to the sensor position. 3 After checking 1 and 2, install and remove the tray at the sensor position to check sensor ON and OFF. REFERENCE: The error cannot be reset before conduction step 3.
E-65 B.C. Motor Temperature	TRAY	The BC motor thermal trip has occurred.	Remove the cause of mechanical overload, and then reset the thermal relay (OL30).
W-67 Tray conveyance has not started	TRAY	Tray conveyance has stopped for more than the set time.	After checking the state of the RX, start tray conveyance.
W-69A Doffer Pulse Count isn't Resetted	DOF	No doffing bar positions have been registered, or the original position cannot be recognized.	1 Register the positions if not registered. 2 If this error message (W-69A) appears after E-69C, register the original position.

9.1A.2 List of Error Messages

Error Messages	Related Machine	Explanation	Actions to be Taken
E-69C Doff.Enc.Pulse (PG7) is Abnormal	DOF	- An input error of encoder (PG7) pulses for the doffing bar movement has occurred. - One second after the issue of the doffing motor start command, the controller monitors the input of encoder pulses every approximately 500 ms. If no specified encoder pulse is input, the controller recognizes it as an error.	- Check the following points: - encoder wiring and connector - encoder coupling (looseness and break) - doffing motor contactor (weak contact) - I/O board (defective) - Doffing motor (overloaded) - Then, register the original position.
E-74A No Req.Signal has come from Winder	TRAY	No request signal has arrived from the winder, so the RX cannot perform positioning.	Wait until a request signal comes. (Only 1 to 1 connection) (Until then, automatic doffing cannot start.)
E-77 Bobbin Shooter is Empty. (PH49)	TBC	The drum is jammed with bobbins. (Even after the specified seconds tCE from the start of the drum motor, the sensor PH49 is not turned OFF.)	- Check whether the shooter is jammed with bobbins. - Carry out the operational check of the PH49. - Check whether the drum is jammed with bobbins. - Check whether bobbins in the shooter are upright.
W-77A TBC bobbins are running short (PH51)	TBC	The hopper is short of bobbins. (PH51 of the hopper is turned off.)	- Load bobbins into the hopper. - Check the operation of the sensor (PH51). - Change setting of W-77A Warning Count and W-77A Stop Count when residual quantity of bobbins in the hopper has a margin.
E-77B TBC shooter jammed (PH52)	TBC	The TBC shooter is jammed with bobbins. (PH52 has been turned off for a long time.)	- Check if the upper shooter is jammed with bobbins. - Check the operation of the sensor (PH52). - Check if cotton dust is attached to the periphery of PH52.
E-78 (OL81) TBC Motor is Tripped.	TBC	Any of the thermal relays (OL81) of the TBC motor is activated.	- Check for any error that caused overload. - Check for bobbin jam.
W-79A Speed balance alarm (R side)	TRAY	- The cylinder feed speed on the R side is faster than the specified value. - The speed difference between the L and R sides is excessive. (L>R)	- If fluff deposits on the tray, rail, etc., clean it. - Adjust the speed controller so that the cylinder feed time becomes about 4 seconds on both the L and R sides.
W-79B Speed balance alarm (L side)	TRAY	- The cylinder feed speed on the L side is faster than the specified value. - The speed difference between the L and R sides is excessive. (L<R)	- If fluff deposits on the tray, rail, etc., clean it. - Adjust the speed controller so that the cylinder feed time becomes about 4 seconds on both the L and R sides.

Error messages of 2-head type RX

Error Messages	Related Machine	Explanation	Actions to be Taken
E-90 Front roller rpm error (PRS4)	RX	The difference between the measured rpm value of the front roller and the indicated value was larger than the specification. (Total draft error, twist multiplier error)	1 Check adjustment of the sensor (PRS4) for rpm measurement. 2 Check if an abnormal load is not applied to the front roller drive system.
E-91A Middle roller (GE) rpm error (PRS6A)	RX	The difference between the measured rpm value of the middle roller (GE side) and the indicated value was larger than the specification. The difference between the measured value of break draft by the drive system on the GE side and the command value was 3%.	1 Check adjustment of the sensor (PRS6A) for rpm measurement. 2 Check if an abnormal load is not applied to the middle roller drive system.
E-91B Middle roller (OE) rpm error (PRS6B)	RX	The difference between the measured rpm value of the middle roller (OE side) and the indicated value was larger than the specification. The difference between the measured value of break draft by the drive system on the OE side and the command value was 3%.	1 Check adjustment of the sensor (PRS6B) for rpm measurement. 2 Check if an abnormal load is not applied to the middle roller drive system.
E-92A Back roller (MH) rpm error (PRS7A)	RX	The difference between the measured rpm value of the back roller (MH side) and the indicated value was larger than the specification. The difference between the measured value of total draft by the drive system on the MH side and the command value was 3%. The difference between the measured value of break draft by the drive system on the MH side and the command value was 3%.	1 Check adjustment of the sensor (PRS7A) for rpm measurement. 2 Check if an abnormal load is not applied to the back roller drive system.
E-92B Back roller (OE) rpm error (PRS7B)	RX	The difference between the measured rpm value of the back roller (OE side) and the indicated value was larger than the specification. The difference between the measured value of total draft by the drive system on the OE side and the command value was 3%. The difference between the measured value of break draft by the drive system on the OE side and the command value was 3%.	1 Check adjustment of the sensor (PRS7B) for rpm measurement. 2 Check if an abnormal load is not applied to the back roller drive system.
E-93 Front roller torque error	RX	The torque value of the front roller drive system exceeded the specification.	1 Check if an abnormal load is not applied to the front roller drive system.
E-94A Middle roller (GE) torque error	RX	The torque value of the middle roller (GE side) drive system exceeded the specification.	1 Check if an abnormal load is not applied to the middle roller drive system.

9.1A.2 List of Error Messages

Error messages of 2-head type RX

Error Messages	Related Machine	Explanation	Actions to be Taken
E-94B Middle roller (OE) torque error	RX	The torque value of the middle roller (OE side) drive system exceeded the specification.	1 Check if an abnormal load is not applied to the middle roller drive system.
E-95A Back roller (GE) torque error	RX	The torque value of the back roller (GE side) drive system exceeded the specification.	1 Check if an abnormal load is not applied to the back roller drive system. 2 Operate with a smaller rpm.
E-95B Back roller (OE) torque error	RX	The torque value of the back roller (OE side) drive system exceeded the specification.	1 Check if an abnormal load is not applied to the back roller drive system. 2 Operate with a smaller rpm.
E-96 Front roller motor temperature switch activated	RX	The temperature switch of the front roller motor was activated.	1 Leave the motor as it is until it cools down (30 minutes or more). 2 Check if the motor load is not extraordinarily heavy. 3 Check if cotton fly, etc. does not adhere to the motor. 4 Turn on the power and check (with enough care for safety) if the fan (M93) operates in ordinary stop status of the RX (without an error). 5 Check for breakage or looseness of the electric wire. 6 If the error has not been eliminated, replace the I/O substrate and the CPU substrate.
E-97A Middle roller (GE) motor temperature switch activated	RX	The temperature switch of the middle roller motor on the GE side was activated.	1 Leave the motor as it is until it cools down (30 minutes or more). 2 Check if the motor load is not extraordinarily heavy. 3 Check if cotton fly, etc. does not adhere to the motor. 4 Turn on the power and check (with enough care for safety) if the fan (M94) operates in ordinary stop status of the RX (without an error). 5 Check for breakage or looseness of the electric wire. 6 If the error has not been eliminated, replace the I/O substrate and the CPU substrate.
E-97B Middle roller (OE) motor temperature switch activated	RX	The temperature switch of the middle roller (OE) motor was activated.	1 Leave the motor as it is until it cools down (30 minutes or more). 2 Check if the motor load is not extraordinarily heavy. 3 Check if cotton fly, etc. does not adhere to the motor. 4 Turn on the power and check (with enough care for safety) if the fan (M95) operates in ordinary stop status of the RX (without an error). 5 Check for breakage or looseness of the electric wire. 6 If the error has not been eliminated, replace the I/O substrate and the CPU substrate.

Three-head Frame Error Message

Error Messages	Related Machine	Explanation	Actions to be Taken
E-90 Front Roller (MH) Pulse is Abnormal.	RX	The difference more than regulation arose between the rotation measurement value of a front roller (MH side), and the directions value. (Total draft is abnormal. The number of twists is abnormal.)	1 Check adjustment of the sensor for rotation measurement (PRS4). 2 Check whether unusual load is applied to the front roller drive system.
E-90C Front roller (GE) rotation speed error (PRS4C)	RX	The difference between the front roller (GE side) rotation measurement value and the direction value was more than specified. (Total draft error, twist count error)	1 Check adjustment of the sensor for rotation measurement (PRS4C). 2 Check whether unusual load is applied to the front roller drive system.
E-91A Mid.Roller (MH) Pulse is Abnormal.	RX	The difference more than regulation arose between the rotation measurement value of a middle roller (MH side), and the directions value. (Brake draft is abnormal.)	1 Check adjustment of the sensor for rotation measurement (PRS6A). 2 Check whether unusual load is applied to the middle roller drive system.
E-91B Mid.Roller (OE) Pulse is Abnormal.	RX	The difference more than regulation arose between the rotation measurement value of a middle roller (OE side), and the directions value. (Brake draft is abnormal.)	1 Check adjustment of the sensor for rotation measurement (PRS6B). 2 Check whether unusual load is applied to the middle roller drive system.
E-91C Middle roller (GE) rotation speed error (PRS6C)	RX	The difference between the middle roller (GE side) rotation measurement value and the direction value was more than specified. The GE-side drive system break draft measurement value was different from the direction value by 3%.	1 Check adjustment of the sensor for rotation measurement (PRS6C). 2 Check whether unusual load is applied to the middle roller drive system.
E-92A Back Roller (MH) Pulse is Abnormal.	RX	The difference more than regulation arose between the rotation measurement value of a back roller (MH side), and the directions value. (Total draft and brake draft are abnormal.)	1 Check adjustment of the sensor for rotation measurement (PRS7A). 2 Check whether unusual load is applied to the back roller drive system.
E-92B Back Roller (OE) Pulse is Abnormal.	RX	The difference more than regulation arose between the rotation measurement value of a back roller (OE side), and the directions value. (Total draft and brake draft are abnormal.)	1 Check adjustment of the sensor for rotation measurement (PRS7B). 2 Check whether unusual load is applied to the back roller drive system.
E-92C Back roller (GE) rotation speed error (PRS7C)	RX	The difference between the back roller (GE side) rotation measurement value and the direction value was more than specified. The GE-side drive system total draft measurement value was different from the direction value by 3%. The GE-side drive system break draft measurement value was different from the direction value by 3%.	1 Check adjustment of the sensor for rotation measurement (PRS7C). 2 Check whether unusual load is applied to the back roller drive system.
E-93 Front Roller (MH) Torque is Abnormal.	RX	The torque value of a front roller (MH) drive system exceeded regulation.	1 Check whether unusual load is applied to the front roller drive system. 2 Carry out a setup which lowered number of rotations, and operate.

9.1A.2 List of Error Messages

Three-head Frame Error Message

Error Messages	Related Machine	Explanation	Actions to be Taken
E-93A Front roller (GE) torque error	RX	The front roller (GE side) drive system torque value exceeded a specified value.	1 Check whether unusual load is applied to the front roller drive system. 2 Operate the roller at a lower rotation speed.
E-94A Mid.Roller (MH) Torque is Abnormal.	RX	The torque value of a middle roller (MH side) drive system exceeded regulation.	1 Check whether unusual load is applied to the middle roller drive system. 2 Carry out a setup which lowered number of rotations, and operate.
E-94B Mid.Roller (OE) Torque is Abnormal.	RX	The torque value of a middle roller (OE side) drive system exceeded regulation.	1 Check whether unusual load is applied to the middle roller drive system. 2 Carry out a setup which lowered number of rotations, and operate.
E-94C Middle roller (GE) torque error	RX	The middle roller (GE side) drive system torque value exceeded a specified value.	1 Check whether unusual load is applied to the middle roller drive system. 2 Operate the roller at a lower rotation speed.
E-95A Back Roller (MH) Torque is Abnormal.	RX	The torque value of a back roller (MH side) drive system exceeded regulation.	1 Check whether unusual load is applied to the back roller drive system. 2 Carry out a setup which lowered number of rotations, and operate.
E-95B Back Roller (OE) Torque is Abnormal.	RX	The torque value of a back roller (OE side) drive system exceeded regulation.	1 Check whether unusual load is applied to the back roller drive system. 2 Carry out a setup which lowered number of rotations, and operate.
E-95C Back roller (GE) torque error	RX	The back roller (GE side) drive system torque value exceeded a specified value.	1 Check whether unusual load is applied to the back roller drive system. 2 Operate the roller at a lower rotation speed.
E-96 Front Roller (MH) Drive Motor Overheats.	RX	Thermal switch on front roller drive motor (MH) works.	1 Don't restart until motor cools down (more than 30 minutes). 2 Check the motor load is too heavy or not. 3 Check the flies come into the motor or not. 4 Switch on the frame, Check the cooling fan (M93). 5 Check the disconnection of wires. 6 If you can't cancel the error, replace the I/O or/and CPU board.
E-96A Front roller (GE) motor thermal switch ON	RX	The front roller (GE) motor thermal switch operated.	1 Leave the motor (for 30 minutes or more) until it cools down. 2 Check if the load on the motor is too heavy. 3 Check if cotton flies, etc. stick to the motor. 4 Turn on the frame and safely check if the fan (M96) is operating while the frame is in a normal standby state. 5 Check if the electric wires are disconnected or loose. 6 When you cannot correct the error, replace the I/O board or/and CPU board.
E-97A Middle Roller Drive Motor (MH side) Overheats.	RX	Thermal switch on middle roller drive motor (MH side) works.	1 Don't restart until motor cools down (more than 30 minutes). 2 Check the motor load is too heavy or not. 3 Check the flies come into the motor or not. 4 Switch on the frame, Check the cooling fan (M94). 5 Check the disconnection of wires. 6 If you can't cancel the error, replace the I/O or/and CPU board.

Three-head Frame Error Message

Error Messages	Related Machine	Explanation	Actions to be Taken
E-97B Middle Roller Drive Motor (OE side) Overheats	RX	Thermal switch on middle roller (OE) drive motor works.	1 Don't restart until motor cools down (more than 30 minutes). 2 Check the motor load is too heavy or not. 3 Check the flies come into the motor or not. 4 Switch on the frame, Check the cooling fan (M95). 5 Check the disconnection of wires. 6 If you can't cancel the error, replace the I/O or/and CPU board.
E-97C Middle roller (GE) motor thermal switch On	RX	The middle roller (GE) motor thermal switch operated.	1 Leave the motor (for 30 minutes or more) until it cools down. 2 Check if the load on the motor is too heavy. 3 Check if cotton flies, etc. stick to the motor. 4 Turn on the frame and safely check if the fan (M97) is operating while the frame is in a normal standby state. 5 Check if the electric wires are disconnected or loose. 6 When you cannot correct the error, replace the I/O board or/and CPU board.
E-100 Synchronous Stop is Defective.	RX	Failure synchronous stop motion between spindle and draft drive.	Mal-twist yarn maybe spun, Check the yarn and remove mal-twist part, if necessary
INV1- * * *	RX		Refer to the instruction manual of inverter.
INV1-??? Error code is unknown	RX	Abnormalities were detected from the inverter. But it is unknown for details.	Open a door with a breaker and cope with it according to the error code currently displayed on the panel of an inverter.
INV1 Inverter is not ready	RX	An inverter is not in the state which can be operated.	1 Check whether the error of an inverter has occurred. 2 Apply operation after the power supply OFF/ON. 3 When an inverter panel is under operation, please make it Drive mode.
INV1 RUN signal circuit is abnormal.	RX	The RUN signal of the main inverter INV1 is turned OFF during an operation.	1 Check whether the INV1 cable is disconnected or loose. 2 When the abnormality does not disappear, replace the I/O1 board or the INV1 control board.
INV1 The command circuit of the INV1 board and that of the I/O1 board are abnormal.	RX	The speed command signal to the main inverter INV1 is abnormal.	1 Check whether the INV1 control signal cable is disconnected or loose. 2 When the abnormality does not disappear, replace the I/O1 board or the INV1 control board.
INV1 Communication error (reading)	RX	Abnormalities were in the serial communication with an inverter.	Communication will be resent if alarm reset is carried out.
INV1 Communication error (writing)	RX		Check the following, when you occur frequently. 1 Check whether there are any disconnection and poor contact of a communication line. 2 Check whether there is any cable which a noise tends to generate near the communication line.
INV7- * * *	SCD		Refer to the instruction manual of inverter.
INV7-??? Error code is unknown	SCD	Abnormalities were detected from the inverter. But it is unknown for details.	Open the door and take the corrective action according to the error code displayed on the inverter panel.

9.1A.2 List of Error Messages

Three-head Frame Error Message

Error Messages	Related Machine	Explanation	Actions to be Taken
INV7 Inverter is not ready	SCD	An inverter is not in the state which can be operated.	1 Check whether the error of an inverter has occurred. 2 Apply operation after the power supply OFF/ON. 3 When an inverter panel is under operation, please make it Drive mode.
INV7 Communication error (reading)	SCD	Abnormalities were in the serial communication with an inverter.	Communication will be resent if alarm reset is carried out. Check the following, when you occur frequently. 1 Check whether there are any disconnection and poor contact of a communication line. 2 Check whether there is any cable which a noise tends to generate near the communication line.
INV7 Communication error (writing)	SCD		
INV8- * * *	RX		Refer to the instruction manual of inverter.
INV8-???	RX	Abnormalities were detected from the inverter. But it is unknown for details.	Open the cover and take the corrective action according to the error code displayed on the inverter panel.
INV8 Inverter is not ready	RX	An inverter is not in the state which can be operated.	1 Check whether the error of an inverter has occurred. 2 Apply operation after the power supply OFF/ON. 3 When an inverter panel is under operation, please make it Drive mode.
INV8 Communication error (reading)	RX	Abnormalities were in the serial communication with an inverter.	Communication will be resent if alarm reset is carried out. Check the following, when you occur frequently. 1 Check whether there are any disconnection and poor contact of a communication line. 2 Check whether there is any cable which a noise tends to generate near the communication line.
INV8 Communication error (writing)	RX		
INV9- * * *	RX		Refer to the instruction manual of inverter.
INV9-???	RX	Abnormalities were detected from the pneumatic motor inverter. But it is unknown for details.	Open the door and take the corrective action according to the error code displayed on the inverter panel.
INV9 Inverter is not ready	RX	An pneumatic motor inverter is not in the state which can be operated.	1 Check whether the error of an inverter has occurred. 2 Apply operation after the power supply OFF/ON. 3 When an inverter panel is under operation, please make it Drive mode.
INV9 Communication error (reading)	RX	Abnormalities were in the serial communication with an pneumatic motor inverter.	Communication will be resent if alarm reset is carried out. Check the following, when you occur frequently. 1 Check whether there are any disconnection and poor contact of a communication line. 2 Check whether there is any cable which a noise tends to generate near the communication line.
INV9 Communication error (writing)	RX		
AMP1- * * * to AMP9- * * *	RX		Refer to Subsection 9.1A.3 "List of Error Messages about Servo Amplifier".
AMP1-A?? to AMP9-A?? Error code unknown	RX	An error was detected from the draft roller and the lift-driving servo amplifier, but nothing is known about its details.	Check whether there are any abnormalities in a draft roller and the lift-driving system.

Three-head Frame Error Message

Error Messages	Related Machine	Explanation	Actions to be Taken
AMP1 to AMP9 Operation preparation not completed	RX	The draft roller and the lift-driving servo amplifier are in an inoperable state.	1 Check whether the error of AMP has occurred. 2 Apply operation after the power supply OFF/ON. 3 Check whether there are any abnormalities in wiring between an I/O board and servo amplifier if it cannot be operated.
AMP1 to AMP9 Servo ON signal circuit error	RX	The servo ON signal of the servo amplifier AMP4 is turned OFF during an operation.	1 Check whether the AMP control signal cable is disconnected or loose. 2 When the abnormality does not disappear, replace the I/O2 board or the AMP.
AMP1 to AMP9 I/O1 substrate command circuit error	RX	The speed command signal to the servo amplifier AMP* had an error.	1 Check for breakage or looseness of the control signal wiring of AMP*. 2 If the error has not been eliminated, replace the I/O1 substrate or the AMP*.
AMP1 to AMP9 I/O2 board command circuit error	RX	The speed command signal to the servo amplifier AMP4 is abnormal.	1 Check whether the AMP control signal cable is disconnected or loose. 2 When the abnormality does not disappear, replace the I/O2 board or the AMP.
AMP1 to AMP9 Communication error (read)	RX	The serial communication with the draft roller and the lift-driving servo amplifier was abnormal.	Communication will be resent if alarm reset is carried out.
AMP1 to AMP9 Communication error (write)	RX		Check the following, when you occur frequently. 1 Check whether there are any disconnection and poor contact of a communication line. 2 Check whether there is any cable which a noise tends to generate near the communication line.
AMP1 to AMP9 Amplifier type error	AMP	The draft roller and the lift-driving servo amplifier are mounted incorrectly.	1 Check whether the amplifier is installed in a right position. 2 Check whether the DIP SW1 of the amplifier is set appropriately. (See 8.[7 2](2).) 3 Check whether communication wire disconnection or contact failure exists.
AMP1-* Feedback pulse circuit error	AMP1-*	The difference between the measured value of production length by the feedback signal of the servo amplifier AMP1-* and the measured value by PRS4 was 3% or more.	1 Check adjustment of the sensor (PRS4) for rpm measurement. 2 Check for breakage or looseness of the control signal wiring of AMP1-*. 3 If the error has not been eliminated, replace the I/O2 substrate or the AMP1.

9.1A.3 List of Error Messages about Servo Amplifier

Alarm	Alarm name	Detecting method	Cause and counter measures
AL01	Over-current (OC)	IPM of the power supply detected following troubles. 1 Over-current 2 Overheating 3 Gate power supply low	1 Short circuit or grounding of armature wire (U, V, or W). 2 Ambient temperature is higher than 55 degrees Celsius. Above problems are likely. If other causes are likely, contact the manufacturer.
AL02	Over voltage (OV)	Main circuit DC power supply (PN voltage) is over 800 VDC.	1 The motor is running with a speed greater than the max.rotation rate. 2 Acceleration causes overshoot exceeding the max. rotation rate. 3 High input power voltage.
AL03	Low PN voltage (PNLV)	Main circuit DC power supply (PN voltage) dropped below 300 VDC.	1 Low input power voltage. 2 If this alarm is issued during motor acceleration, power supply capacity shortage is likely.
AL04	Amplifier abnormal (ACINF)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL05	Amplifier abnormal (CROH)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL06	Resolver disconnected (RELV)	Resolver signal voltage between R1 and R2 dropped below 0.35 VAC.	Check that the resolver cable is not broken or disconnected. Test the voltage level between R1 and R2. (It should be over 0.35 V in the AC range.)
AL07	Power status error (POWFAIL)	CPU cannot judge the amplifier type.	1 CPU's software version is not consistent with the unit configuration. 2 The amplifier is out of order. Above problems are likely. Please contact the manufacturer.
AL08	Amplifier abnormal (SOH)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL09	Amplifier abnormal (RGOH)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL10	Amplifier abnormal (RGST)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL11	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL12	DSP error (DSPERR)	DSP stopped working.	The amplifier is out of order. Please replace the amplifier.
AL13	Amplifier abnormal (BLV)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL14	Brake error (BERR)	1 When the dynamic brake is used, brake output turning ON did not generate the brake confirmation signal input. 3 2 When the holding brake is used, brake output turning ON kept the brake confirmation signal ON.	Read the descriptions on the dynamic and holding brake connections and check the wiring and used accessories.
AL15	Over-current detection (OCS)	The motor current exceeded 120% of the current limit	1 The motor in rotation was locked mechanically. 2 Short-circuit or grounding of the U, V, and W phases of setting. the motor. 3 Erroneous setting of the parameter UP-02 (Motor application)

Alarm	Alarm name	Detecting method	Cause and counter measures
AL16	Speed amplifier saturation (VAS)	The speed amplifier was saturated and current exceeding the maximum level flew more than 3 seconds.	1 The motor is locked mechanically. 2 The load inertia is too great to accelerate or decelerate. 3 Erroneous setting of the parameter UP-02 (Motor application)
AL17	Motor overload (MOL)	Motor temperature calculated from the actual load level rose exceeding 110% of the maximum temperature setting.	1 Load is too much for the motor output capacity. 2 Operation cycles are too short for the motor capacity.
AL18	Instant thermal (POL)	This alarm is issued when output current is more than 120% of the motor rated current.	1 The motor is locked mechanically. 2 Load is too much for the motor output capacity. 3 Erroneous setting of the parameter UP-02 (Motor application)
AL19	Resolver error (RESERR)	The resolver feedback counter made erroneous counting.	1 Bad contact of the resolver cabling. 2 The resolver cable is installed near the power line and affected by noises. Check the resolver cable. 3 The ground line between the motor and the amplifier is broken or disconnected.
AL20	Overspeed (OSPD)	The rotation rate exceeded 120% of the maximum rotation setting.	1 The servo adjustment value is overshooting. Conduct auto tuning. 2 A command value was too much. 3 Bad contact of the resolver cabling. 4 The resolver cable is installed near the power line and affected by noises. 5 The ground line between the motor and the amplifier is broken or disconnected.
AL21	Deviation counter over (FULL)	Accumulated pulses in the deviation counter exceeded the following detection level. Detection level = Motor maximum rotation rate/60 × Sensor split count/TP2 × 10 EXAMPLE: Max.rpm 2000 rpm, Motor sensor:resolver Target loop gain TP2 = 60 Detection level = 2000/60 × 24000/60 × 10 = 133000 (pulses)	1 Load is too much for the motor output capacity. 2 The load inertia is too great to accelerate or decelerate. 3 The value for TP2 (Target loop gain) is set too high. 4 Current limit is set too low.
AL22	Amplifier abnormal (ABSE)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL23	Amplifier abnormal (ACN)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL24	Amplifier abnormal (BAL)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL25	Amplifier abnormal (OPALM)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL26	Parameter setting error (CERR)	Parameters UP-01 (Control mode) and UP-02 (Applicable motor) are not set, or set with invalid values.	This alarm is issued on the first power input. Set the user parameters UP-01 and UP-02, turn off the machine, make sure that the display went off, and then turn on the machine again.

9.1A.3 List of Error Messages about Servo Amplifier

Alarm	Alarm name	Detecting method	Cause and counter measures
AL27	Amplifier abnormal (AEERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL28	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL29	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL30	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL31	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL32	Zero point saving error (MZE)	This alarm is issued together with AL06, AL19, AL22, AL23, and AL27.	Read the descriptions on AL06, AL19, AL22, AL23, and AL27.
AL33	Amplifier abnormal (CLD)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL34	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL35	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL36	Amplifier abnormal (ABT)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL37	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL38	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL39	Amplifier abnormal (ILLERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL40	Amplifier abnormal (EREE)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL41	Amplifier abnormal (ETER)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL42	Amplifier abnormal (EBACK)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL43	Amplifier abnormal (ECKER)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL44	Amplifier abnormal (EBAL)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL45	Amplifier abnormal (EABSE)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL46	Amplifier abnormal (EOSPD)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL47	Amplifier abnormal (EWER)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL48	Amplifier abnormal (EINT)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.
AL49	Amplifier abnormal (PHSERR)	The amplifier is out of order.	The amplifier is out of order. Please replace the amplifier.

STATIONARY COP DOFFER INSTRUCTION MANUAL Model SCD (SECOND EDITION)

Thank you for purchasing the SCD Type Stationary Cop Doffer.

This instruction manual describes the correct installation, operating principles, function, adjustment, and maintenance of the SCD, all of which should be familiar to all personnel concerned.

Before operating, adjusting, or maintaining the SCD, be sure to read this manual carefully to understand the SCD. Always keep this manual in a safe and fixed place.

Introduction:

This manual is edited separately to provide instructions for SCD. It consists of ten sections. For items not covered herein, refer to the instruction manual for the standard roving machine. Especially for matters related to safety, please first read Section S.1 of instruction manual.

As to the contents of the items described in both of the two above-said manuals, give priority to this SCD manual.

Specifications, operating instructions, and dimensions in this manual are subject to change for improvements without prior notice.

TOYOTA shall take no responsibility for loss, damage, expense or claims for bodily injury or property damage arising from incorrect usage which is not in accordance with the instructions given in this manual.

In no event will TOYOTA be liable for products resulting from the use of this machine.

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1B. GENERAL DESCRIPTIONS

SCD is a stationary cop doffer attached to a ring spinning frame, RX.

[1] Features of SCD

- (1) Fully automatic operation from the withdrawal of full cop to the loading of empty bobbin.
- (2) Adoption of intermediate peg system that requires no restriction on the ring diameter enables to produce large packages.
- (3) Doffing process takes only about two minutes of the RX stop time, contributing much to improving the productivity of high production type RXs in particular.

[2] Principal Specifications

Doffing system	Simultaneous doffing by the SCD fastened to the RX
Maximum width for doffing	RX : 1540 mm
Maximum width when not in operation (in storage)	RX : 1100 mm
Doffing bar drive	Variable-speed drive using an inverter
Drive system	Full automatic drive
Machine stop time for doffing	2 minutes
Conveyance of empty bobbins and cops	Peg tray system
Winder coupling method	1: Single SCD or 1: SCDs, under the peg tray system

[3] Floor Construction Work

[3.1] Investigation of Floor Face

The RX floor standard should be satisfied.

[4] Power Supply

- (1) Total capacity of all motors of an SCD is 1.5 to 1.6 kW.
- (2) The power supply for the RX is used, it is not necessary to arrange for a separate power supply for the SCD.

[5] Compressed Air

Principal operation of SCD is powered by the compressed air and the motors. Consequently, the compressed air is a power source for the SCD, simultaneously having a close relationship with the performance of SCD and the life of its major components and parts.

[5.1] Capacity

- (1) In the case of peg tray system
Capacity is calculated as follows:
Air consumption by the number of full cops supplied/min $\times$ number of SCDs
- (2) If the capacity is smaller than the specified level, the pressure will drop during operation to cause SCD troubles.

[5.2] Characteristics

- (1) If the moisture, oil, tar, etc. are mixed in the air, it accelerates the degradation of gripper and other resin and/or rubber parts or causes malfunction of solenoid valve and other pneumatic equipment, all of these resulting in the air leak and damaged parts.
- (2) Clean supply of air shall be provided by using air-cleaning equipment such as dryer and filters.
- (3) Specifications
 - Temperature : Room temperature
 - Pressure : 0.59 MPa (6 kgf/cm²)
 - Dewing point : -17°C (under atmospheric pressure)
 - Oil : 0.1% or under
 - Solid : 5 µm or under

[5.3] Piping Work

- (1) After the piping work is completed by customer, blow the air from the upstream side (flushing) to remove dirt and foreign matters from the piping completely and cover the open ends of piping with taping.
- (2) If the capacity is smaller than the specified level, the pressure drops during operation to cause SCD troubles.

[6] Attached Special Device

[6.1] Detection of Doffing Error

Detects full cops remaining unremoved on the spindle at the doffing time.

[6.2] Interlocking with Adjacent RXs

If inter-frame passages are narrow, those RXs shall be interlocked to ensure that adjacent RXs will not enter the doffing process simultaneously.

2B. RELATED EQUIPMENT

To use the SCD troublefree in good operating condition, certain requirements must be met with the related equipment. It is necessary to conduct inspection of the related equipment not only at the time of installation but periodically thereafter to maintain them always in the best working condition.

[1] Bobbin

[1.1] Accuracy of Bobbin

- (1) Drawings of recommended bobbins for SCD are submitted to customers.
- (2) The drawings indicate bobbin performance required by both SCD and RX.
- (3) The absolutely necessary bobbin performance for the SCD and troubles likely to happen if it is not met with are as follows:

Item	Standard	Trouble that may occur if the standard is not met
Tilting of bobbin to the bottom as the reference line	1 mm max.	Stop of bobbin feed and/or damaged gripper
Spindle pull-out force	600 to 1000 g according to a specified TOYOTA gauge	Doffing error, incomplete insertion (floating), popping up of bobbin during the rotation of spindle
Base of a bobbin bottom	Required	Clogged bobbin feed and/or damaged picker
Bottom inside diameter	(RX) $20.05(+0.05/-0) \times 30$ Height (for 7 and 8 inches) $18.75(+0.05/-0) \times 30$ Height (for 6 inches)	Tilting may occur at the intermediate peg if the diameter is excessively out of specification.
Roundness at the top	3R max.	Rocking vibration may increase if the roundness is small or the bobbin may be held tilted if it is great.

- (4) When placing an order with a bobbin manufacturer, customer is required to demand quality requirements such as color, heat resistance, rigidity, etc. on top of the full compliance with the conditions stated in the TOYOTA drawings.
- (5) When receiving delivery from the bobbin manufacturer, customer is required to always conduct a receiving inspection to check on the delivered quality. (The gauge for acceptance inspection (onerous) is to be delivered as a special gauge. In case of need, please order for it at an early time.)

[1.2] Screening of Defective Bobbins

Bobbins may be damaged or deformed during use.

Using defective bobbins not fully meeting the requirements may cause damaged parts. Eliminate such defective bobbins.

(1) Screening by routine inspection

1. When bobbins are arranged on intermediate peg, see if any bobbin or bobbins are tilted or loosely fitted.
2. Discover a deformed bobbin by the lit trouble indicator lamp during the bobbin loading. Remove the defective bobbin immediately and store it in a “defective bobbin box” provided by customer at a corner of the workshop passage.
3. Inspect a collection of defective bobbins after a fixed period of time and send them for repair or dump.

(2) Periodical Screening

Conduct a 100% inspection of bobbins once a year to repair or dump defective bobbins.

[1.3] Screening of Bobbins with Residual Waste Yarn

- (1) Bobbins with residual waste yarn cause as much or more trouble as defective bobbins to the bobbin loading and doffing operation.
- (2) Install a residual yarn detector & remover device to the winder side or check bobbins for residual yarn during conveyance, for preventing bobbins with residual yarn from entering SCDs.
- (3) Customer will arrange for a box to store bobbins with residual yarn in and screen such a bobbin as soon as it is discovered.

[1.4] Content of Defective Bobbins and Repair Method

No.	Content of defective bobbin	Probable cause on the side of bobbin	Repair method
1	Incomplete insertion (floating) is generated.	1. Contraction of bobbin diameter a. Contraction caused by the elasticity of synthetic yarn b. Thermal contraction in heat setting 2. Flaw caused by button chip 3. Attachment of fiber dusts and/or dirt to the bore produces resistance. 4. Deformed bobbin bottom base	Grind with a reamer. Clean the bobbin. Repair the base to correct form.
2	Bobbin pops up or vibrates during rotation.	Button chipper of spindle unable to nip a bobbin.	Unable to repair if the bore of the bobbin is ground.
3	Yarn breakage occurs at the starting time because of yarn contact with the bobbin top.	Roundness of bobbin top is insufficient or a flaw is present at the top.	Apply a chamfering tool and buffing to the top to finish. Don't overfinish with excessive roundness. Top and bottom distance 3 mm max.
4	Doffing error occurs.	Same as item No. 1	Same as item No. 1
5	Gripped in tilted position.	Either top roundness being excessive or the top having a flaw.	Same as item No. 3
6	Bobbin is tilted on the tray.	Either the base is deformed or the bottom is bent.	Repair the base or bobbin to correct form.

[2] Cautions on Transferring Roller Box for Periodical Maintenance

⚠ CAUTION

In order to prevent the intermediate peg from being damaged or the bar from being deformed, never place or slide a box for storing top rollers and/or cradles on top of the intermediate peg.



[3] Cautions on the Travel of a Roving or Roller Dolly between RXs

⚠ CAUTION

When it is necessary to enter a roving or roller dolly into an inter-frame passage, always check that the RXs on both sides of the passage are not near the full-bobbin state.

(Leave from the passage between the RXs with ample time to spare before the RXs reach the full-bobbin state.)

A guard rail is provided on the downstream side in the longitudinal direction of RXs for protecting the RX and SCD. When passing between RXs, be careful not to allow the dolly to make contact with this guard rail. (It is not a guide rail.)

[4] Blow Cleaner (Option)

[4.1] Interlocking with RXs

- (1) It is necessary for the blow cleaner to be sidetracked when the SCD is in operation.
- (2) The RX is provided with a circuit for interlocking the above-mentioned sidetracking.

[4.2] Blow Cleaner Nozzle Position



- (1) A blow cleaner nozzle shall be always attached to two locations (A), namely the intermediate peg and the peg train conveyer.
- (2) If possible, a nozzle should be attached each to the top surface of the gripper and the main shaft.

Each of the above-mentioned locations is prone to collect fly and the blow cleaner is quite effective in reducing trouble attributable to the fly deposition.

3B. INSTALLATION



⚠ CAUTION

During installation, observe the safety rules given in

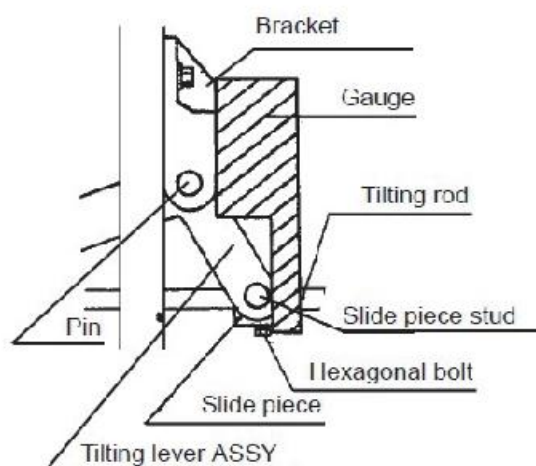
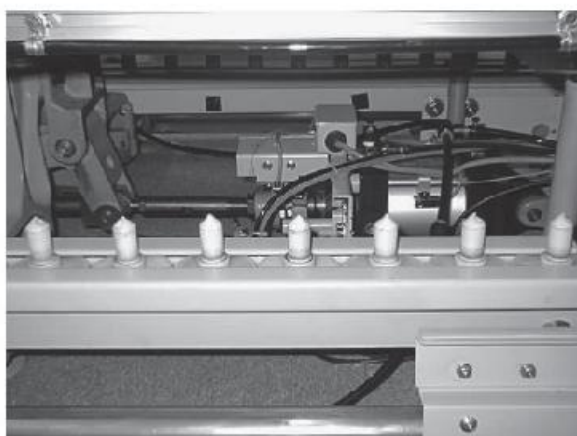
S.1 "Safe Work"

S.1.1 "Rules for Installation Work"

[1] Installing the Tilting-related Components

⚠ CAUTION

When getting up from a low position, watch your head.



- (1) Set the bracket according to the long-parts arrangement drawing.
- (2) Install the tilting lever ASSY to the bracket with pins.
NOTE: Be sure to apply lock paint 1401B (THREE-BOND) or equivalent to each screws.
- (3) Fully retract the air cylinder shaft, then install the tilting rod through the slide piece to the cylinder coupling installed on the air cylinder rod.
- (4) Determine the slide piece stud positions using the gauge.
- (5) At the middle section, insert the tilting rod through the slide piece and connect the rods using the coupling.
- (6) Determine the stud positions using the gauge and then tighten the bolt to secure the slide piece.

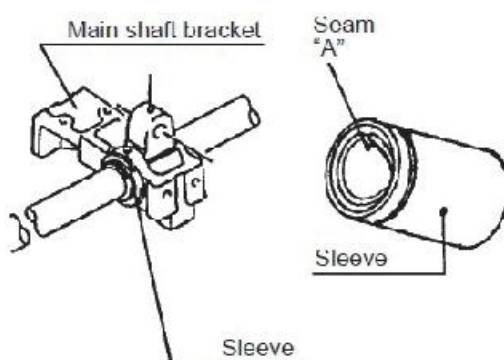
[2] Installing the Main Shaft-related Components



⚠ CAUTION

- Two or more workers should handle long parts.
- When handling components, watch the surroundings.

[2.1] Installing the Main Shaft Brackets

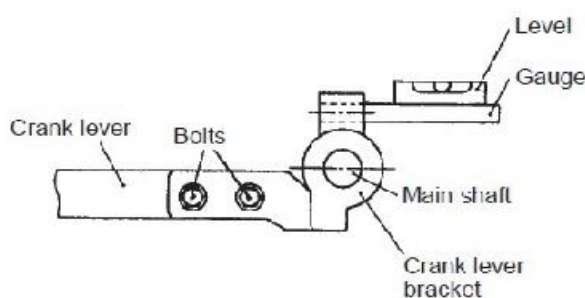


- (1) Set the main shaft brackets to the pieces, according to the long-parts arrangement drawing.

NOTE: Seam "A" of the metal section inside the sleeves should be just face-up.

- (2) Adjust the adjustment bolts on each bracket to bring them into light contact with the foot, then secure them with nuts.

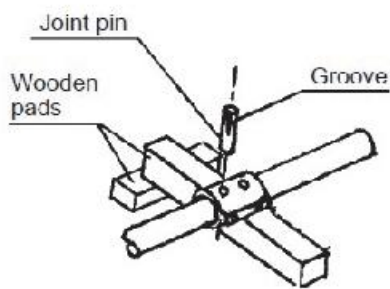
[2.2] Leveling the Crank Lever Bracket



- (1) Insert the gauge into the crank lever bracket.
- (2) Loosen the two bolts and level the bracket.

[2.3] Connecting the Main Shaft Components

- (1) Wipe off dust or dirt from the main shaft components and then insert them through the sleeves. (Refer to the long-parts arrangement drawing.)
- (2) While inserting the main shaft components, set the lifter arms, adjustment rings, couplings, and springs to the specified positions.

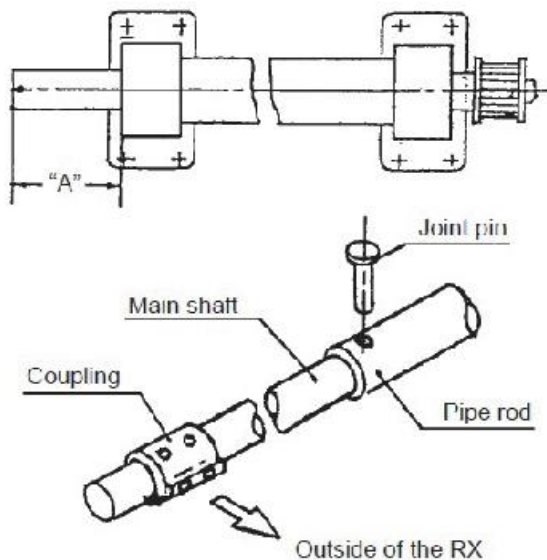


- (3) As shown at left, apply wooden pads to each coupling and then drive joint pins into it with their grooved ends facing up, to connect main shaft components with each other.

NOTE: The couplings should be mounted with their setscrews facing outside the RX.

- (4) After connecting all main shaft components, grasp the main shaft near the bracket by hand and move it up and down and to the front and rear to see that there is any gap.

[2.4] Connecting the Main Shaft with the Power Cylinder

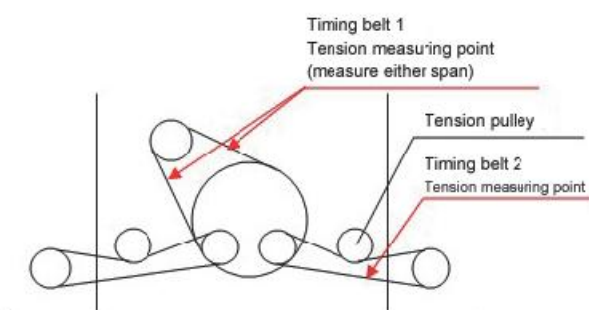


- (1) Adjust the pipe rod position of the power cylinder so that distance "A" (shown at left) comes to the below length at both ends.
Distance "A"
646 mm (Less than 1200 spindles)
645 mm (More than 1200 spindles)

NOTE: Make sure that distance "A" should be the same at right and left ends.

- (2) Drive joint pins into the couplings with their setscrews facing outside the RX.

[2.5] Timing Belt Tension Setting



- Using an optical belt tension meter, adjust each tension of the timing belts 1 and 2 (shown in the figure to the left) to its corresponding frequency shown in the table below. At this time, press each tension pulley against its corresponding timing belt for adjustment.

(For the tension measuring points, see the figure to the left. For how to use the tension meter, see Section 4.1.13.)

	Required tension [N]	Frequency [Hz]
Timing belt 1	318 ~ 429	138 ~ 160
Timing belt 2	413 ~ 559	70 ~ 82

[2.6] Timing Belt Maintenance

Worn belt teeth (about half of tooth width)	
Crack on belt rear side	
Worn pulley teeth (about 0.3 to 0.8 mm)	
Crack at belt teeth root (about half of tooth width)	
Belt swelling by oil adhesion	

Inspect the RX s shown below after turning the frame power off.

Inspect the belt and pulleys visually at the time of regular inspection (every three months).

Replace them as early as possible when any of the conditions at left is found.

Please bear in mind that the belt life may be shortened to one year or less (five years or less for the pulley) depending on the spinning conditions.

During a regular inspection, clean the pulley teeth and the belt using a brush or the like.

In addition, adjust the tension with the method above also when the belt is replaced with a new one.

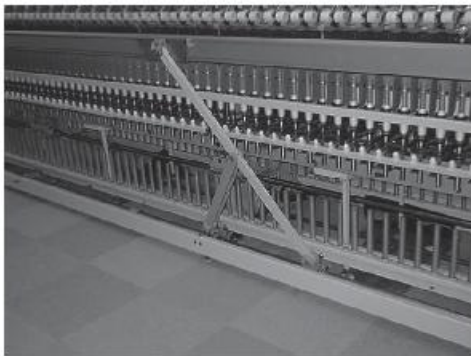
[3] Installing the Lifter Arm-related Components



⚠ CAUTION

During this job, be sure to grasp both parts of a scissors-shaped lifter arm to prevent pinched or crushed fingers.

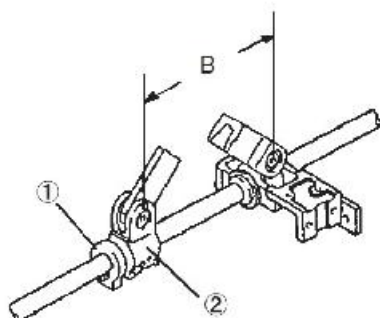
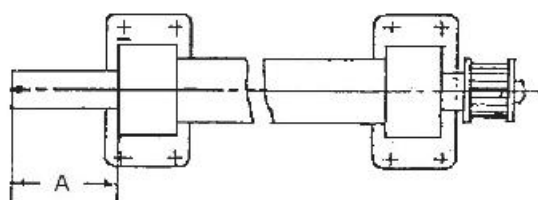
[3.1] Installing the Lifter Arms



- (1) Install the support arms and the lifter arms by using pins and then secure them with setscrews.
NOTE: The setscrews should be face-up.
- (2) Number of support arms and lifter arms with screw holes for wiring.

		OE	GE	MH
2-head	up to 576 spindles	2	—	—
	up to 1440 spindles	2	2	—
3-head	up to 1824 spindles	2	2	2

[3.2] Positioning the Lifter Arms



- (1) Check again that pipe rod protrusion "A" (shown at left) of the power cylinder is the below length at both ends.

Distance "A"

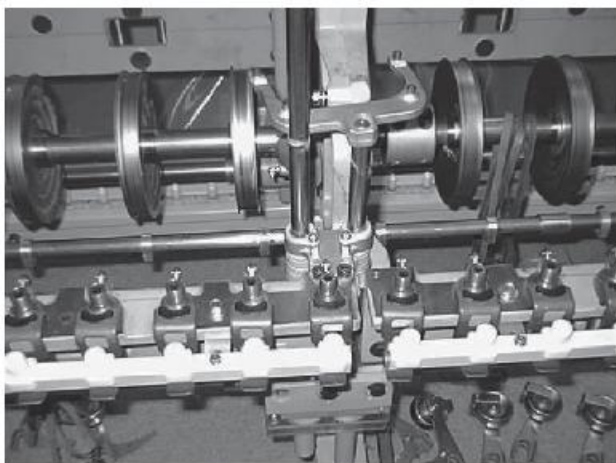
646 mm (Less than 1200 spindles)

645 mm (More than 1200 spindles)

- (2) Adjust the lifter arm brackets and crank lever brackets so that pin-to-pin distance "B" (shown at left) between the center of pins comes to the value listed below, and then secure the adjustment ring ① and the lifter arm bracket ②.

	Pipe rod protrusion "A" (mm)	Pin-to-pin distance "B" (mm)	Doffing bar position
1200 spindles or less	646	1127	Bobbin holding position
more than 1200 spindles	645	1126	Bobbin holding position + 5mm

[4] Installing the Step Bar



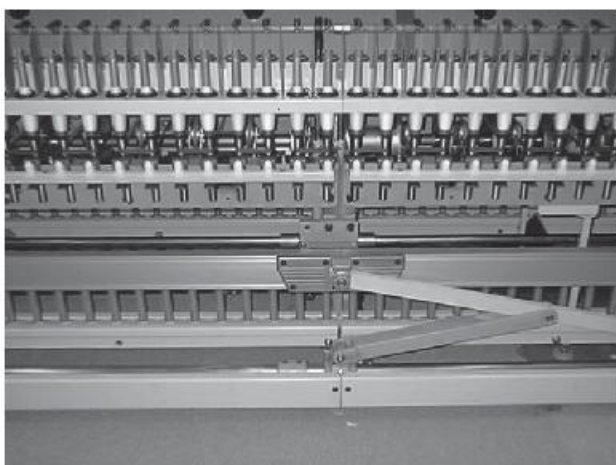
- (1) Install the step bar to the bottom face of the spindle rail, without causing the step bar brackets to incline.

[5] Installing the Doffing Bar



⚠ CAUTION

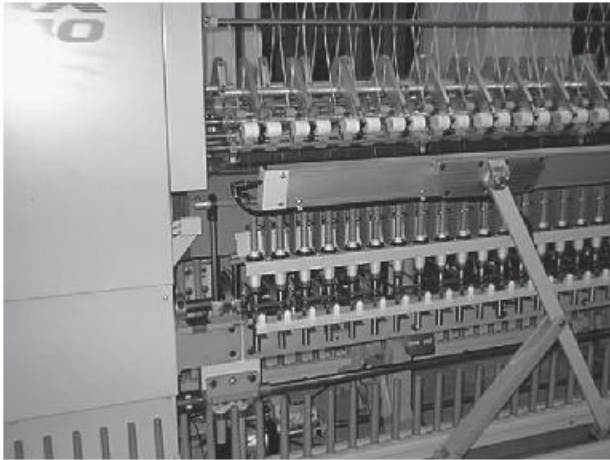
- Two or more workers should handle long parts.
- When handling components, watch the surroundings.



- (1) Put nuts in the groove of the doffing bar beforehand.
- (2) Install the doffing bar, referring to the longparts arrangement diagram.

NOTE: Fully insert gripper air tubes to the mating grippers without any bends.

[6] Connecting the Air Tubes



- (1) Connect the air tubes, referring to the air circuit diagram.
- (2) When fitting the piping near the rotating or slideway sections, secure the tubes with fasteners or binders.
NOTE: Carefully handle the air tubes not to bend them.
- (3) Fully insert joints to prevent air leakage.

[7] Electrical Wiring

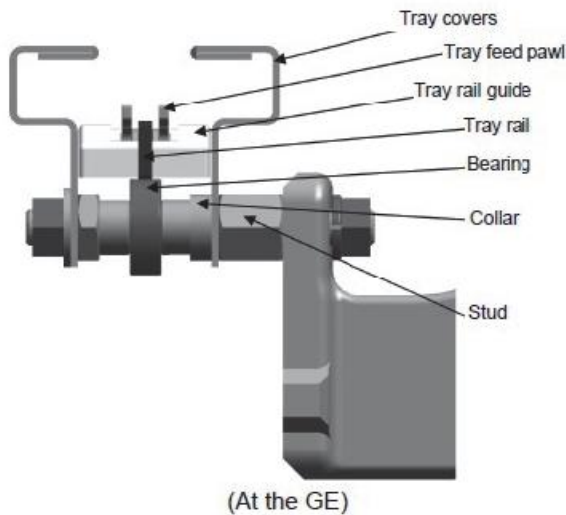
- (1) Connect the wiring of PH62, PRS10 and PRS11 to the GE terminal board.

[8] Installing the Tray-related Components

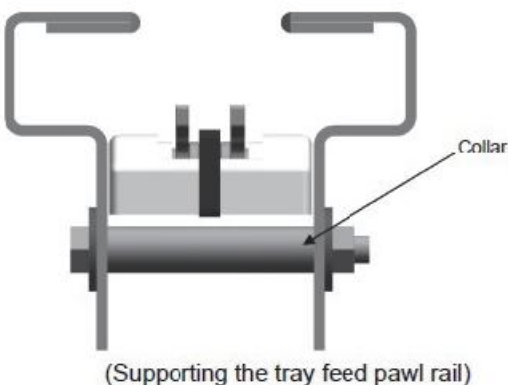
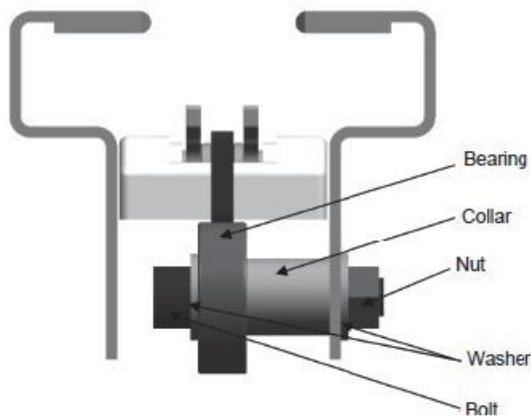
⚠ CAUTION

When getting up from a low position, watch your head.

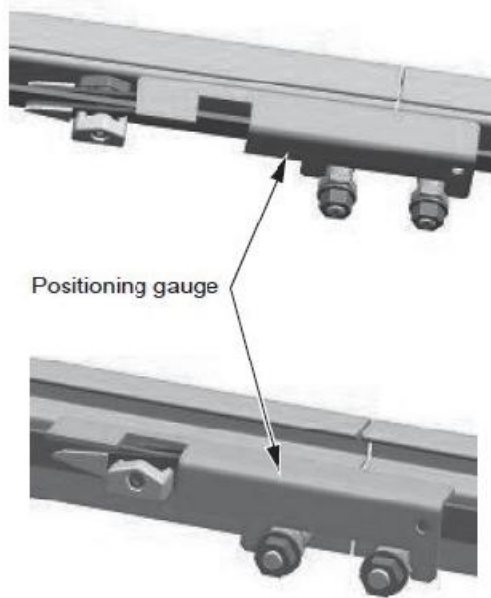
[8.1] Installing the Tray Covers



- (1) Set a stud into a hole provided in an inside tray cover to secure the cover to the end of the piece.
- (2) Set a collar, bearing (at the GE only), and stopper to the stud.
- (3) Secure a collar, bearing and washer to the hole provided in the inside tray cover.
- (4) Put spacers into the tray feed pawl rail and then install it to the RX.
- (5) Install the joint pieces to the tray feed pawl rail.
- (6) Secure an outside tray cover with washers and nuts.
- (7) Secure a collar that prevents the tray cover from being deformed with bolts, nuts, and washers.

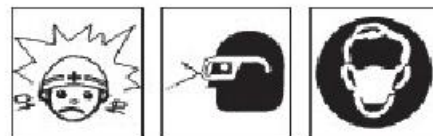


[8.2] Positioning the Tray Feed Pawl Rail



- (1) Set the tray air cylinder shaft as follows:
 - At the tray carrying-in side: Retract the cylinder shaft. (OUT state)
 - At the tray carrying-out side: Pull out the cylinder shaft. (IN state)
- (2) With the gauge in contact with the tip end of the tray feed pawl, fix each rail by tightening the bolts.
- (3) After completion of assembly, put three to five trays from the inlet and make them travel through the SCD to check that they can be transferred smoothly.

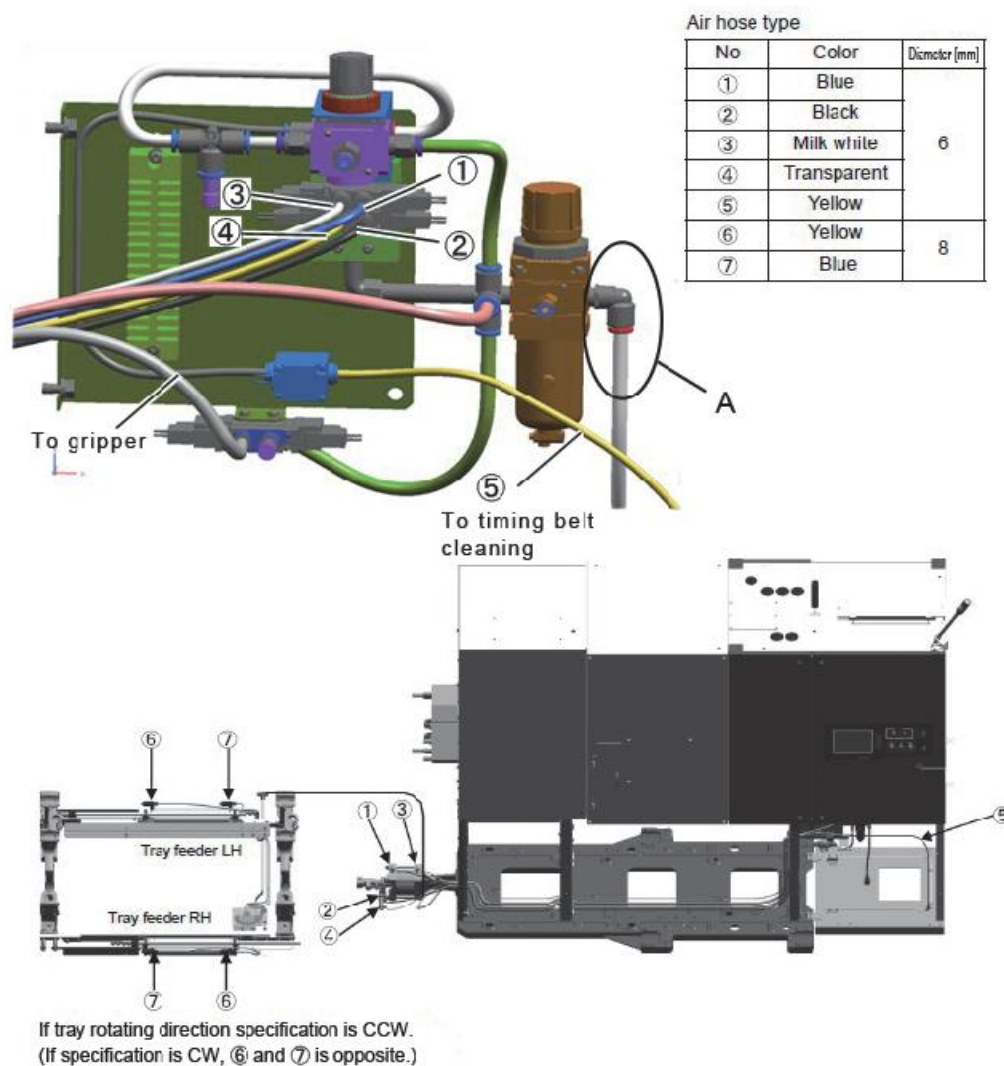
[9] Checking the Air Piping



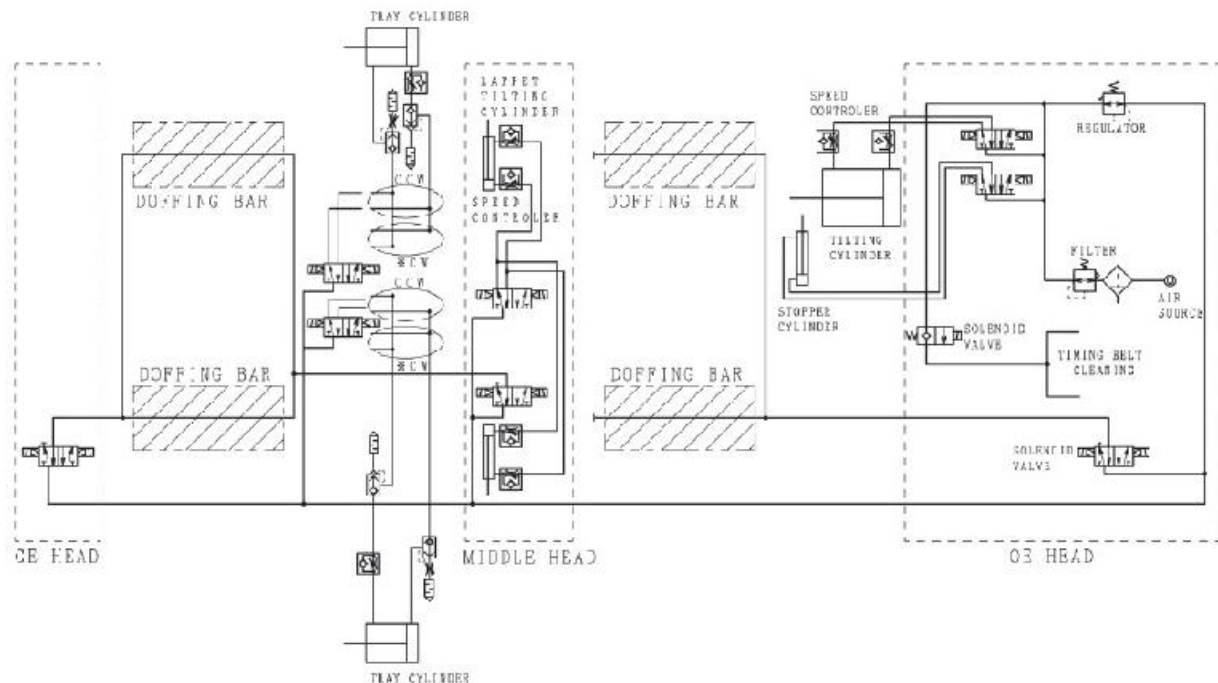
⚠ CAUTION

When jetting out air, always put on safety goggles, gauge mask, and ear plugs.

- (1) Check that the air piping is connected as shown below.
- (2) When you supply compressed air to a new CSD for the first time in your plant, jet out air into the plant (not into the SCD) before connecting the tube to the joint "A" in order to remove foreign materials (e.g., iron powder and moisture) from inside of the piping, and then supply air into the SCD.



■ Air piping diagram 1200 spindles or less (RX300G/E)

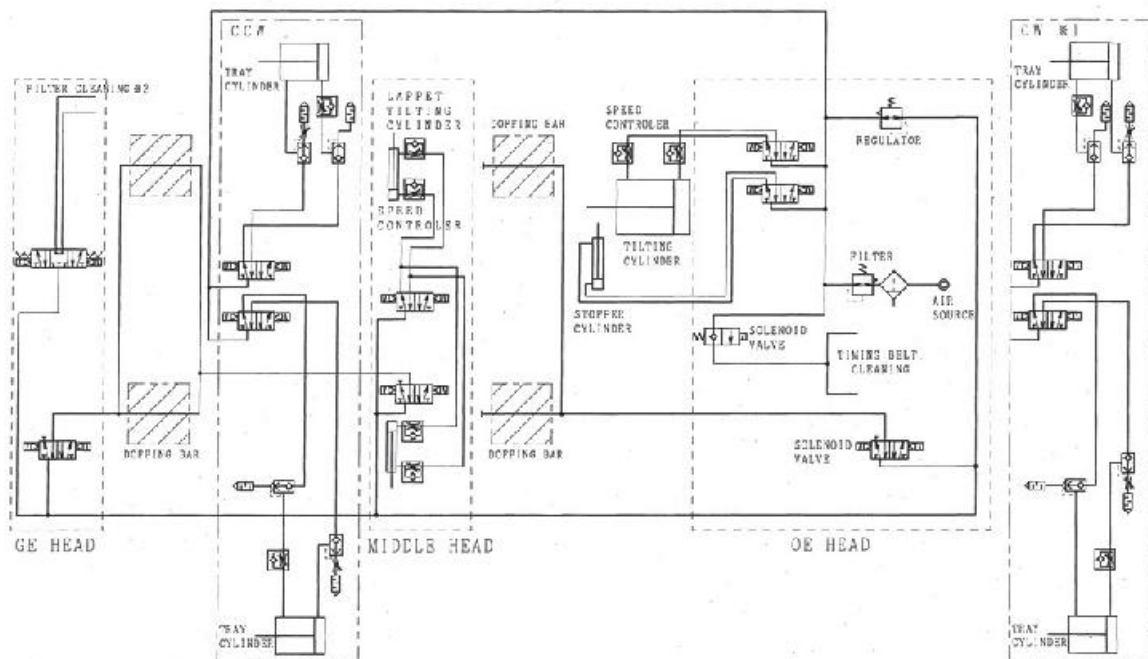


TRAY FEED DIRECTION: CCW (COUNTERCLOCKWISE)
: CW (CLOCKWISE)
* IN CASE OF WINDER LINK

COMPRESSED AIR SPECIFICATIONS
TEMPERATURE : ROOM TEMPERATURE
PRESSURE : 0.5MPa (5kg/cm²)
DEW POINT : -1°C
OIL CONTENTS: BELOW 0.1 %
MICRO DUSTS : BELOW 5µm

DRAWING NO.
RX300-013-101A

■ Air piping diagram 1248 to 1440 spindles (RX300G/E 2-head version)



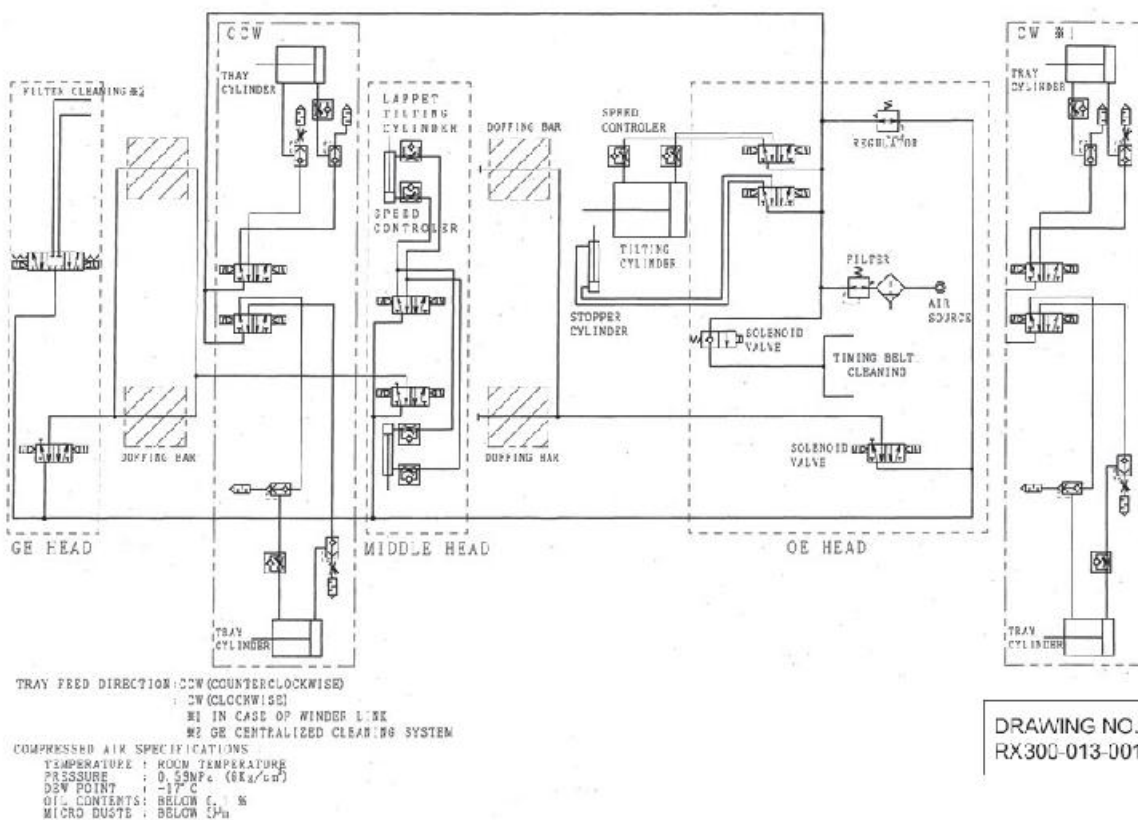
TRAY FEED DIRECTION: CCW (COUNTERCLOCKWISE)
: CW (CLOCKWISE)
* IN CASE OF WINDER LINK
* OS: CENTRALIZED CLEANING SYSTEM

COMPRESSED AIR SPECIFICATIONS
TEMPERATURE : ROOM TEMPERATURE
PRESSURE : 0.5MPa (5kg/cm²)
DEW POINT : -1°C
OIL CONTENTS: BELOW 0.1 %
MICRO DUSTS : BELOW 5µm

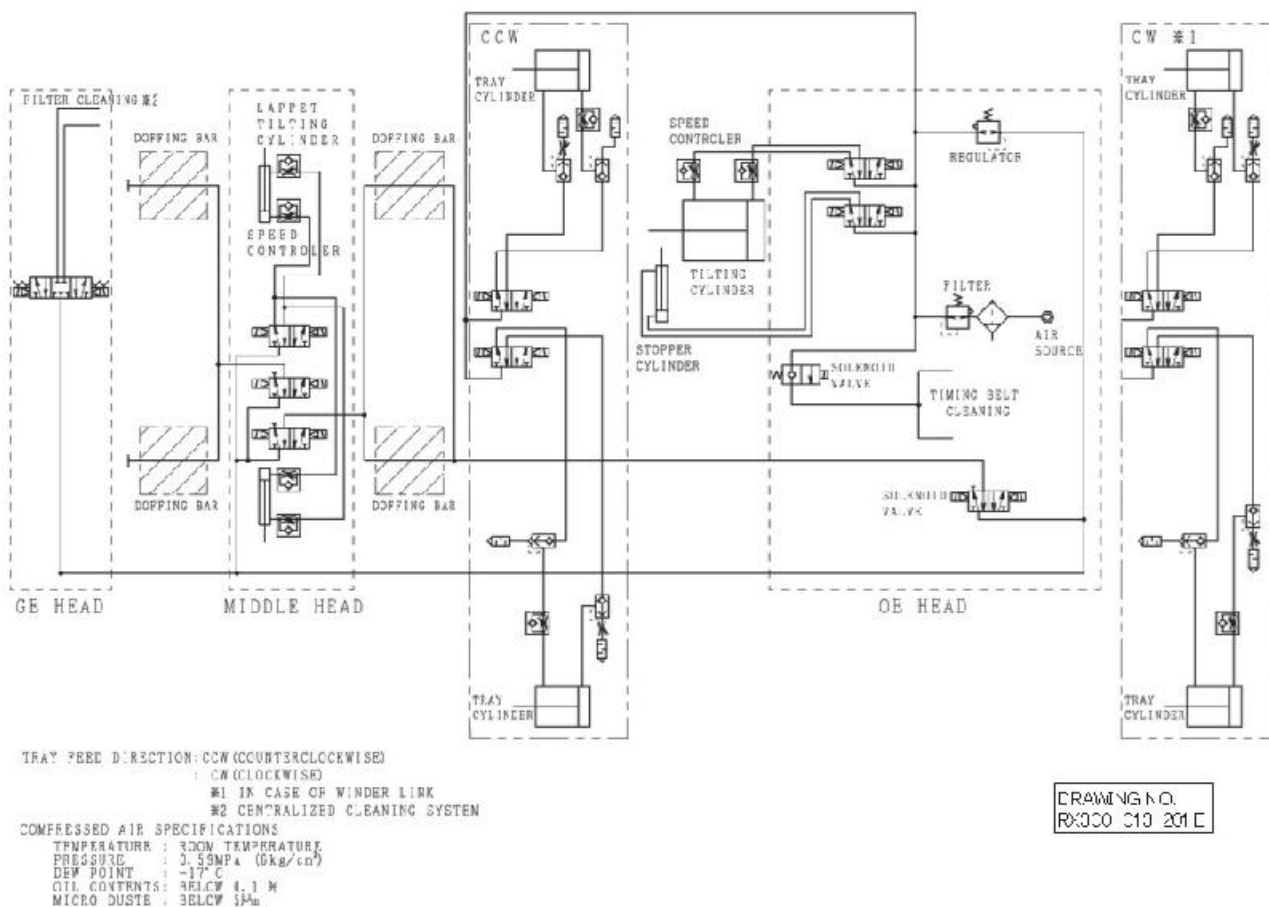
DRAWING NO.
RX300-013-103

3B. INSTALLATION

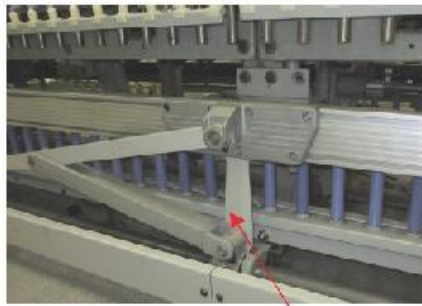
■ Air piping diagram 1440 spindles or more (RX300G 3-head version)



■ Air piping diagram 1440 spindles or more (RX300E)



[10] Installing the Stoppers



Stopper



Stopper

Install only when the machine specification is more than 1200 spindles.

A stopper should be installed for each and every location where the support arms are installed.

	L dimension [mm]
6 inch Tube	180
7 inch Tube	210
8 inch Tube	230



Stepped



- (1) Insert the stepped pin into the portion that connects the support arm and the crank lever bracket and set it.

Set the pin so that the stepped part faces toward the inner part of the machine and only the stepped part sticks out from the support arm.

Point: The stepped pin is used for this portion only. Other pin connection portions are not stepped.

- (2) Attach the bottom part of the stopper to the crank lever bracket where the pin sticks out. The bend at the upper part of the stopper should face toward the inner part of the machine.

Bend faces inside



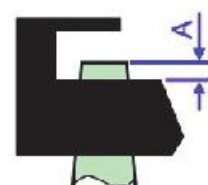
Attach to the crank lever bracket



Point:

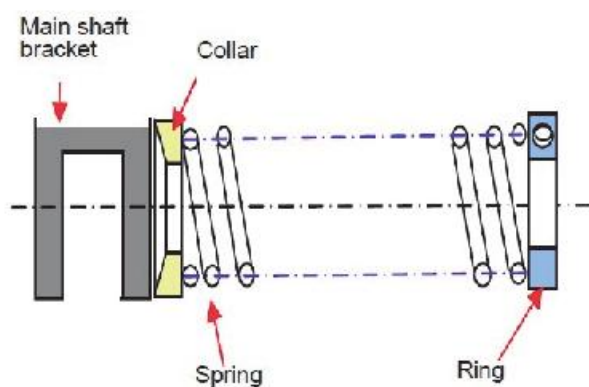
The position that the stopper holds the doffing is the bobbin holding height on the tray ($A = 5 \text{ mm}$ in the following figure).

(A: the distance between the bobbin and the gripper surface)



[11] Installing the Springs

Install only when the machine specification is more than 1200 spindles.



- (1) Set the height of the doffing bar at the bobbin holding position (the position held by the stopper) so that the spring length becomes 315 mm (compress by 140 mm from the natural length of 455 mm).

1. With the doffing bar held by the stopper, mark the shaft position at the end of the collar (attach the concave side of the collar to the bracket).
2. Lift the doffing bar so that the main shaft moves toward OE by 140 mm.
3. Push the collar, the spring, and the ring toward the main shaft bracket so that there is no gap between them, and fasten the ring's setscrew.

(2) Installation location

The table on the left shows the block numbers to insert the springs.

The block numbers are shown in the following figure and counted from the OE side.

Number of spindles and spring instillation block numbers

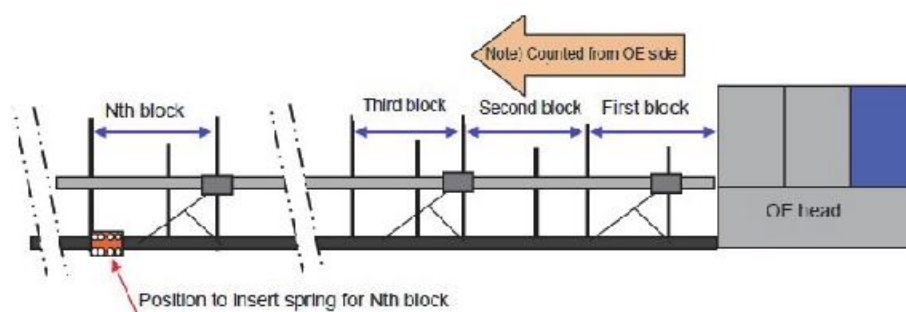
<3-head>

Number	Machanical draft				Electronic draft			
1248	23				23			
1296	24				24			
1344	24				24			
1392	18	24			17	24		
1440	19	25			17	25		
1448	21	27			17	25		
1536	21	27			19	27		
1584	14	22	28		13	25	31	
1632	16	24	30		15	26	32	
1680	9	16	24	30	9	17	26	32
1728	9	19	25	31	9	19	27	33
1776	3	9	21	27	3	9	21	27
1824	5	11	22	28	5	11	23	28

Number of spindles and spring instillation block numbers

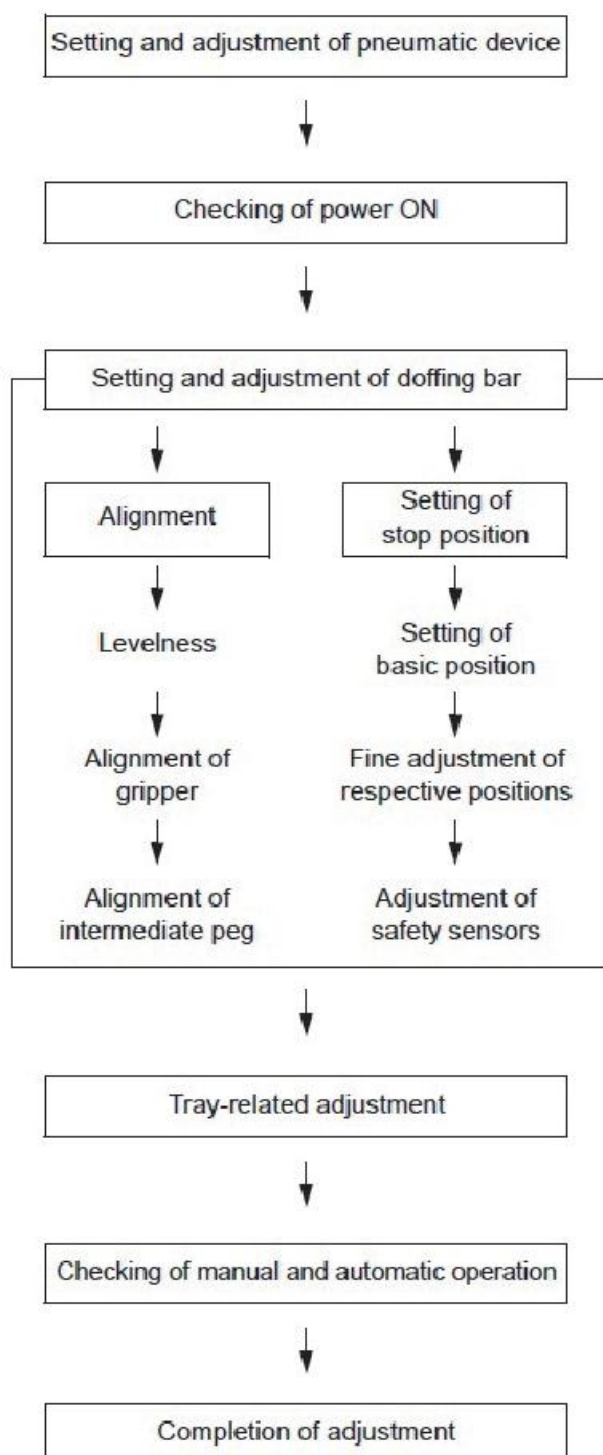
<2-head>

Number	Machanical draft		Electronic draft	
1248	21		21	
1296	23		23	
1344	23		23	
1392	19	25	19	25
1440	19	25	19	25



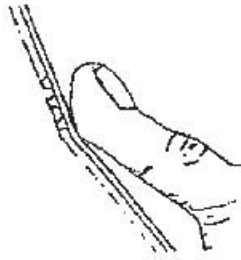
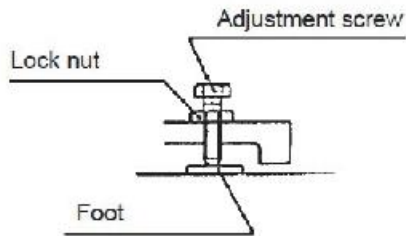
4B. ADJUSTMENT

[1] Outline of SCD Adjustment



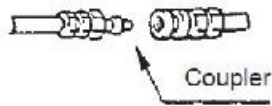
- (1) The adjustment procedure shown at left is given in Sections 4B[2]and 4B[3].
- (2) The checking procedure shown at left is given in Section 4B[4]
- (3) The adjustment procedures shown at left are given in Sections 4B[5]through 4B[10].
REFERENCE: The alignment and stop-position setting during installation should be made concurrently.
- (4) The adjustment procedures shown at left are given in Section 4B [11].

[1.1] Checking Before Adjustment



- (1) Checking the following items:
 1. Are the bolts for tilting-related parts, and the bolts for the guard rail and conveyer tightened fully?
 2. Are sensors installed to specified positions?
 3. Is the tension for the timing belt appropriate?
 - a. Make the tension slightly tighter than normally.
 - b. Press the belt hard with the thumb and see it yields slightly.
- (2) Checking air piping
Is the piping to the gripper completed?
- (3) Checking the connection of crossover lines, etc.
 1. Is the doffing motor connected?
 2. Is the encoder line not in contact with the rotating unit?
 3. Are sensors connected?
- (4) Arrange the surrounding area of the SCD orderly to ensure uninterrupted lifting and opening operation of the SCD.
 1. Check if any tools, etc. are left on top of the spindle rail.
 2. Check if gauges, etc. are left on the spindle.

[2] Adjustment of Compressed Air Pressure

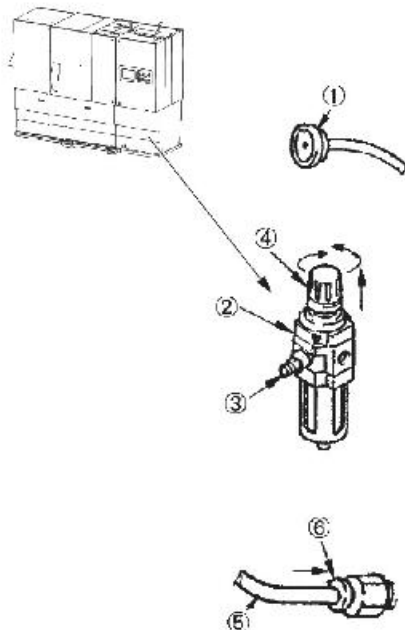


Connect the SCD to the factory source of compressed air.

NOTE:

- (1) Compressed air to be supplied to the SCD shall meet the conditions as provided in Section 1B.5 "Compressed Air".
- (2) If failed to meet the conditions, such compressed air deteriorates the performance of SCD and the expected level of performance may not be maintained.

[2.1] Adjustment of Compressed Air Pressure for SCD



- (1) Connect the gauge ① to ③.
- (2) Pull the regulating valve ④ of regulator ② upward.
- (3) Adjust the pressure by turning the regulating valve ④.
 - To increase pressure: Turn ④ clockwise.
 - To decrease pressure: Turn ④ counterclockwise.

IMPORTANT

- Set a value within the range shown in the table below.
- Check the pressure periodically.

Specified pressure MPa (kgf/cm ²)	0.54 – 0.59 5.5 – 6
Target pressure Mpa (kgf/cm ²)	0.56 5.7

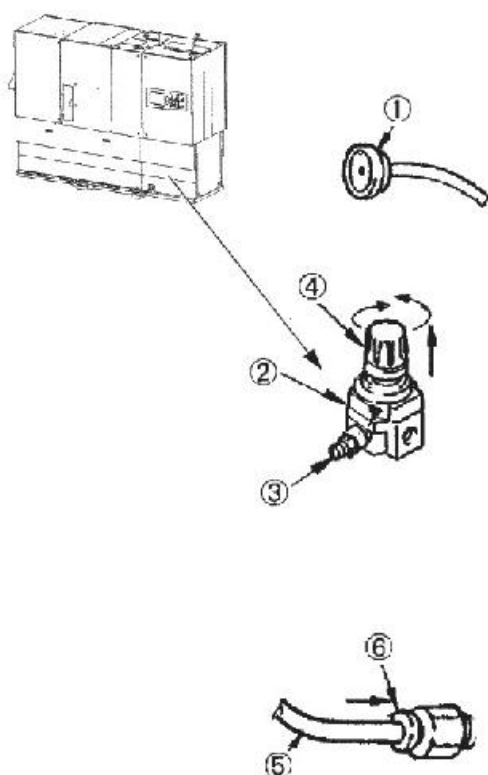
- (4) After adjustment, press ④ down.
- (5) To remove the gauge ①, withdraw the pipe ⑤ while pressing the sleeve ⑥.

REFERENCE: Part No. of gauge
R8277-05010-00

[2.2] Adjustment of Compressed Air Pressure for Gripper/Tray



- (1) Connect the gauge ① to ③.
- (2) Pull the regulating valve ④ of regulator ② upward.
- (3) Adjust the pressure by turning the regulating valve ④.
 - To increase pressure: Turn ④ clockwise.
 - To decrease pressure: Turn ④ counterclockwise.



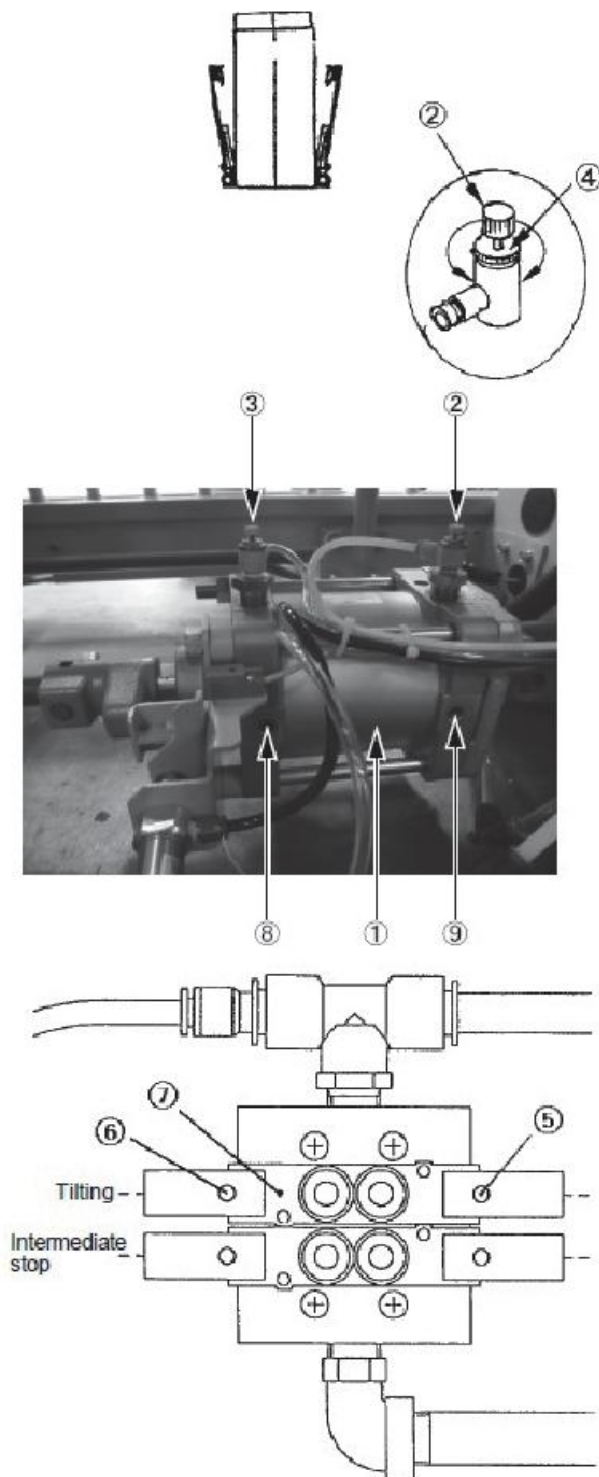
IMPORTANT

- | |
|---|
| <ul style="list-style-type: none"> • Never set the air pressure exceeding 0.4 MPa (4.1 kgf/cm²). • Periodically check the air pressure.
(Refer to Subsection MB [2.5] "Periodical Maintenance".) |
| SPECIFIED PRESSURE: 0.4 MPa (4.1 kgf/cm²) |

- (4) After adjustment, press ④ down.
- (5) To remove the gauge ①, withdraw the pipe ⑤ while pressing the sleeve ⑥.

NOTE: For the tray air pressure for 1248 spindles or more, the same procedure as 4B.2.1 is applied.

[3] Adjustment of Doffing Bar Opening/Closing Speed



- (1) Adjust the opening/closing speed of doffing bar by setting it to the highest position.
- (2) Adjust the speed with the speed controller ② and ③ of the OE tilting cylinder ①.
- (3) Opening/closing speed adjustment
 1. Turn the lock nut ④ counterclockwise to loosen it.
 2. First fully tighten the speed controllers ② and ③ clockwise.
 3. To open the bar, press the change-over valve ⑥ of solenoid valve ⑦ by hand. (Turn the power OFF.) Check the opening speed, and turn the controller ③ counterclockwise to adjust it.
 4. To close the bar, press the change-over valve ⑤ of solenoid valve ⑦ by hand. Check the closing speed, and turn the controller ② counterclockwise to adjust it.

STANDARD: Select the speed that completes opening or closing operation in 4 to 5 seconds.
5. After completing adjustment, turn the nut ④ clockwise to lock.
- (4) Open and close the doffing bar 3 to 4 times to re-check the speed.
- (5) Adjust the cushion.
 1. Tighten the adjust screws ⑧ and ⑨ fully clockwise using a flat screwdriver.
 2. Turn the screws 1/2 counterclockwise.

STANDARD: When the bar completes opening or closing, it shall rock only slightly.

[4] Checking before Trial Run

[4.1] Checking of Input Signals

CAUTION

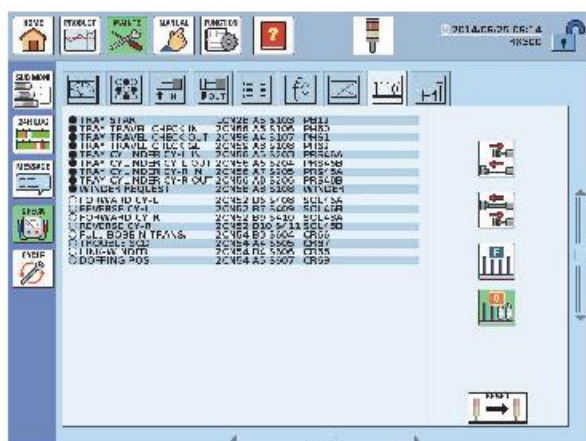
During checking of "input/output" signals on the I/O monitor, do not carry out the following jobs or allow workers except the checker and related co-workers to approach the RX and SCD.

- Peg tray installation & adjustment
- Doffing bar installation & adjustment
- Other assembly or cleaning jobs



- (1) Call up the SCD I/O monitor according to the steps below.

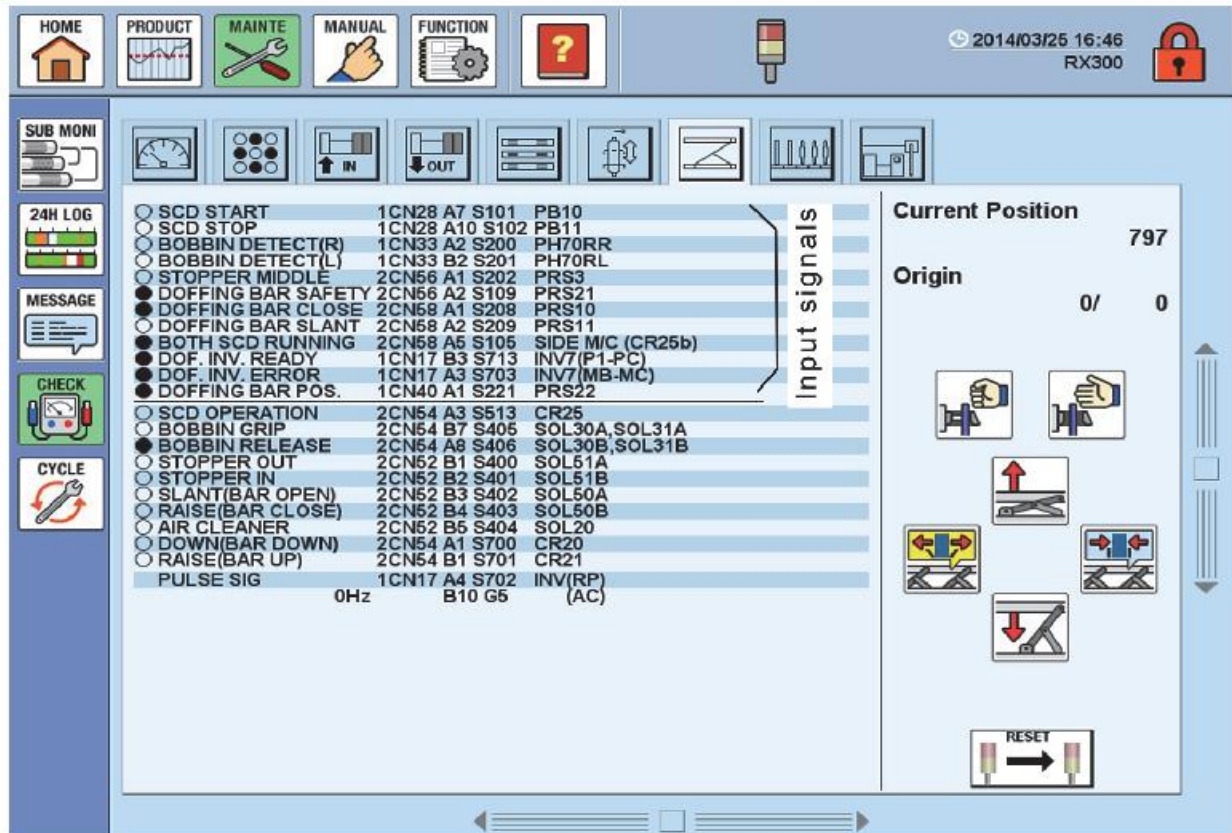
1. Touch [MAINT] – [CHECK] to open the I/O monitor screen.
2. Touch  to open the screen related to I/O monitor and doffer.



3. Touch  to open the screen related to the I/O monitor and tray.

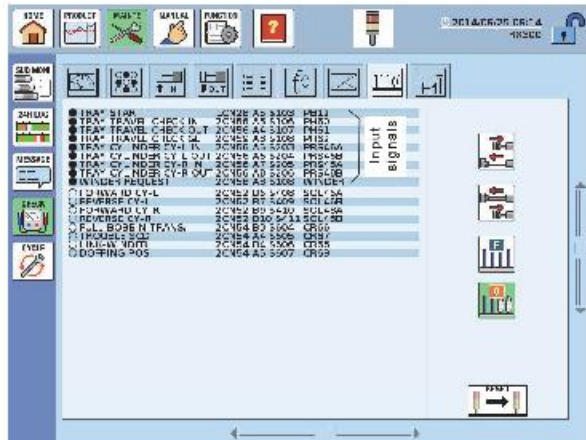
4B. ADJUSTMENT

(2) Checking the doffer-related input signals

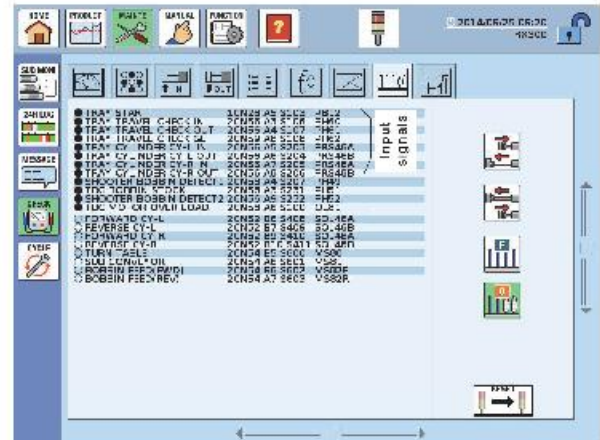


1	SCD START	●
	ON if SCD start switch is ON.	
2	SCD STOP	●
	ON if SCD stop switch is ON.	
3	BOBBIN DETECT (R)	●
	ON if PH 70R detects a bobbin.	
	3-head specification is PH70R or PH71R	
4	BOBBIN DETECT (L)	●
	ON if PH70L detect a bobbin.	
	3-head specification is PH70L or PH71L	
5	STOPPER MIDDLE	●
	ON if PRS3 detects the stopper in out position.	
6	DOFFING BAR SAFETY	●
	ON if safety sensor PRS21 is set to ON.	
7	DOFFING BAR CLOSE	●
	ON if PRS10 detects the doffing bar in close position.	
8	DOFFING BAR SLANT	●
	ON if PRS11 detects the doffing bar in open position.	
9	BOTH SCD RUNNING	●
	ON if interlocked with the adjacent RX.	
10	DOF. INV. READY	●
	ON if the doffer inverter is ready for operation.	
11	DOF. INV. ERROR	●
	ON if the doffer inverter has no abnormality.	
12	DOFFING BAR POS.	●
	On if PRS22 detects tooth skipping.	

(3) Checking tray-related input signals



Winder linked specification



TBC linked specification

1	TRAY START	●
	ON if the tray start switch is ON.	
2	TRAY TRAVEL CHECK IN	●
	ON when PH60 bobbin is missing.	
3	TRAY TRAVEL CHECK OUT	●
	ON when PH61 bobbin is missing.	
4	TRAY TRAVEL CHECK GE	●
	ON when PH62 bobbin is missing.	
5	TRAY CYLINDER CY-L IN	●
	ON if PRS46A detects tray cylinder CY-L in the in position.	
6	TRAY CYLINDER CY-L OUT	●
	ON if PRS46B detects tray cylinder CY-L in the out position.	
7	TRAY CYLINDER CY-R IN	●
	ON if PRS48A detects tray cylinder CY-R in the in position.	
8	TRAY CYLINDER CY-R OUT	●
	ON if PRS48B detects tray cylinder CY-R in the out position.	
9	WINDER REQUEST	●
	(winder linked specification)	
	ON when the winder request signal is detected.	
10	SHOOTER BOBBIN DETECT1	●
	(TBC linked specification)	
	ON when there are no bobbins on the PH49 shooter.	
11	TBC BOBBIN STOCK	●
	(TBC linked specification)	
	ON when there are bobbins on the PH51 bobbin hopper.	
12	SHOOTER BOBBIN CHECK2	●
	ON when there are no bobbins on the PH52 shooter.	
13	TBC MOTOR OVER LOAD	●
	(TBC linked specification)	
	ON when OL81 is normal.	

[4.2] Caution for Doffing Bar Operation on Initial Setting-Adjustment Screen

CAUTION

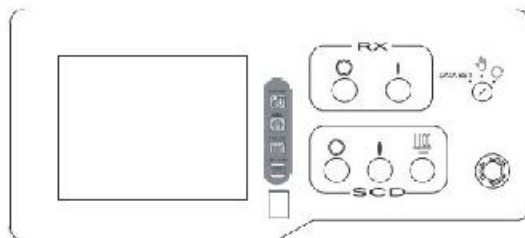
In the installation mode, move the doffing bar by inching operation.

When moving the doffing bar in the installation mode, be sure to inch the SCD to the set position. Avoid excessive up- or down-operation.

The initial setting-adjustment operation is performed at the time of installation and involves some restrictions.

- (1) The SCD should be powered on in the stage of doffing bar adjustment (stop motion or open/closed position).

NOTE: If error message “W-69A. Adjust doffer origin.” is displayed,
Operation in normal mode neither manually nor automatically.
Operate after touching [FUNCTION] – [Initial Setting-Adjustment].
(Refer to Subsection 6B [2.4])

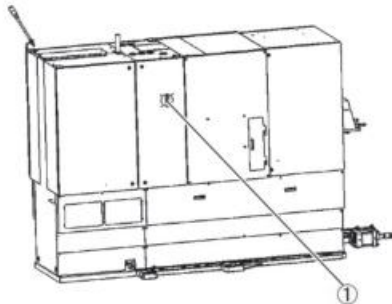


Emergency stop button

- (2) In the installation mode,
 - The doffing bar can be operated only manually.
 - The doffing bar moves up or down only at low speed in all domains.
 - The doffing bar will not stop at any undefined positions.
 - The doffing bar can inch if the PA position is not set. (Only when the inching switch is held down, the bar can inch.)
- (3) To operate the SCD for adjustment in a trial run, hold down the Interlock switch and press the doffing bar up or down switch with one hand, while making ready to press the emergency stop button at any moment with the other hand.

[4.3] Checking the Doffing Bar Stop Motion and Movement Direction

- (1) Touch [FUNCTION] – [Initial Setting-Adjustment] – [Adjusting of Doffer Motion] to open the screen.
(Refer to Subsection 6B [2.4])
- (2) Check the doffing bar stop motion according to the steps given below.

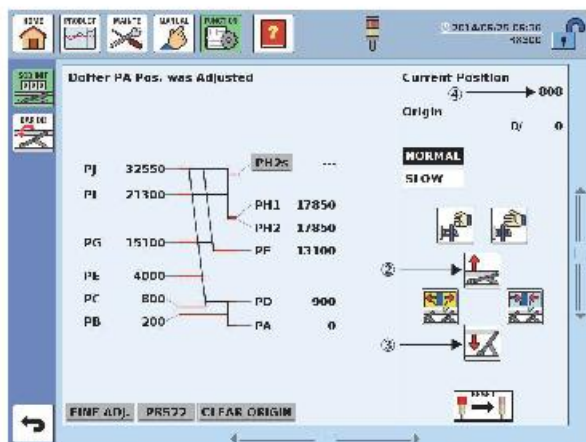


⚠ CAUTION

Be sure to have two persons handle this job. One person should be ready to turn off the main circuit breaker ① at any moment and the other person should operate the doffing bar with the control panel.

⚠ CAUTION

Always keep one hand ready to press the emergency stop button at any moment when operating the SCD.



1. Press the doffing bar up switch ② or down switch ③.
2. Immediately press the emergency stop button, and check that the doffing bar stops.
3. If the doffing bar does not stop normally,
 - check the wiring and routing and
 - check whether the connectors are firmly inserted.

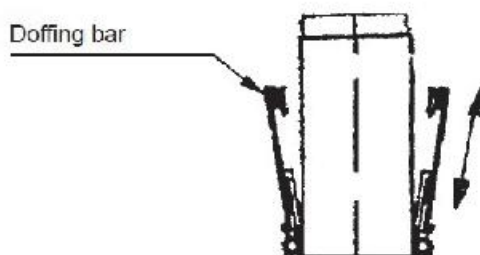
4B. ADJUSTMENT

- (3) Check the movement direction of the doffing bar (motor rotation direction) according to the steps below.



WARNING

Only authorized personnel should handle the primary power supply.



1. Check the Now Count ④ shown on the screen.
2. Press each of the doffing bar up and down switches while holding down the interlock switch. Check that the doffing bar moves up and down and that the Now Count ④ increases and decreases.
3. If the doffing bar moves up or down in a direction which is the reverse of what was intended by the switch pressed:
 - Check the wiring between the inverter motors.

[5] Adjustment of Doffing Bar (1200 spindles or less)



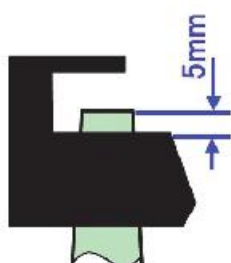
⚠ CAUTION

During adjustment work of the SCD, do not allow workers other than the persons in charge to approach the RX and SCD.

The workers in charge should observe the precautions below.

- When the doffing bar is in opening or closing operation, never let hands or a part of your body get between the RX and doffing bar.
- When the doffing bar is moving up or down, never let hands or a part of your body get under the lifter arm or the support arm.

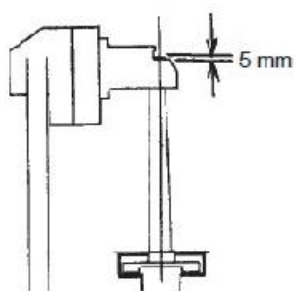
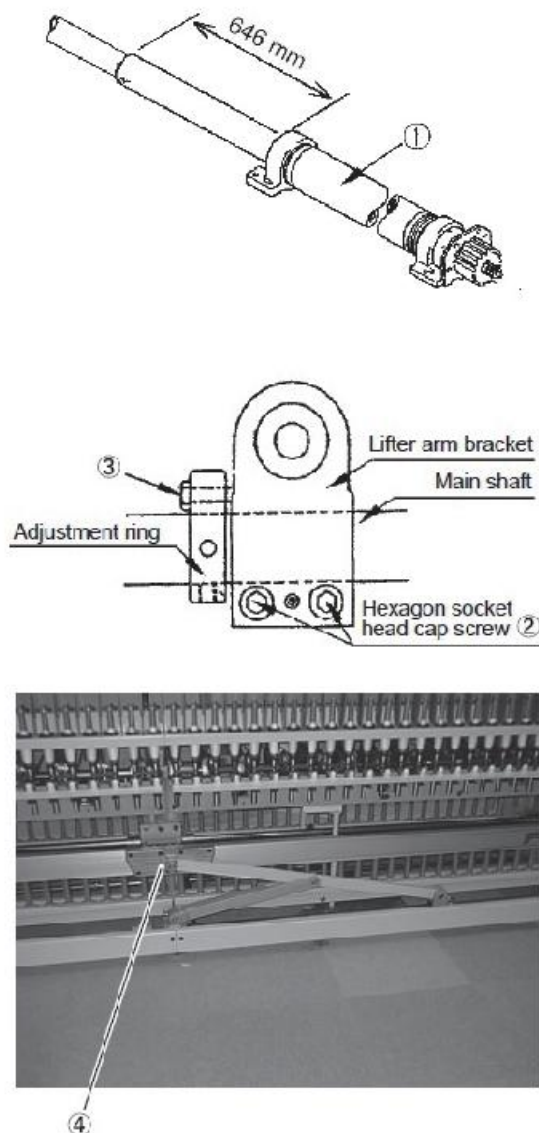
[5.1] Adjustment of Height



- (1) Set the doffing bar to the bobbin holding position (PA) on the tray.

NOTE: If the error message “W-69A” has appeared, move the doffing bar according to the instructions given in Subsection 6B [2.5] “Doffer Motion Adjustment”.

4B. ADJUSTMENT



(2) Adjust the height of doffing bar at PA position.

1. Check that the power cylinder ① is extracted by "646 mm".

TIP: Both cylinders on the right- and left-hand sides shall be equally extracted by "646 mm".

2. Loosen the bolt ②.
3. Turn adjustment bolt ③ so that the bobbin top comes 5 mm above the gripper cap.

TIP: Make this adjustment at respective brackets ④.

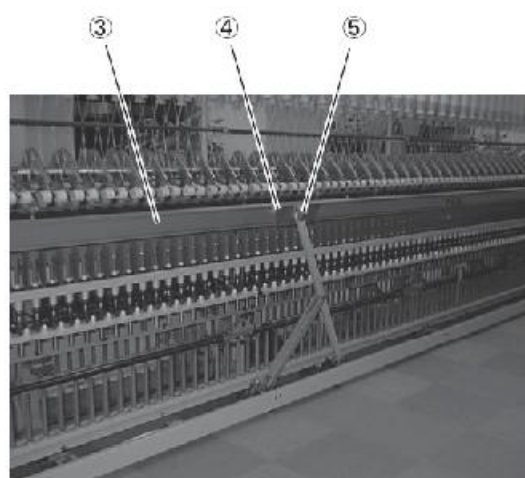
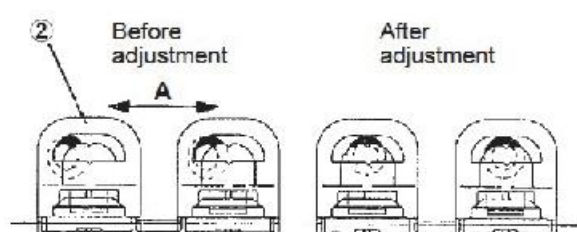
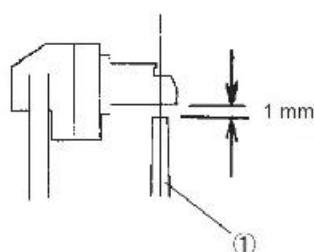
4. Following the same way, adjust the doffing bars at respective brackets ④.
5. After adjusting the height of all brackets, recheck them.
6. Tighten bolt ②.

TIP: After tightening, check the height again.

NOTE: Readjust the height of doffing bar after completing all the other adjustments.

[5.2] Right-to-Left Adjustment of the Doffing Bar

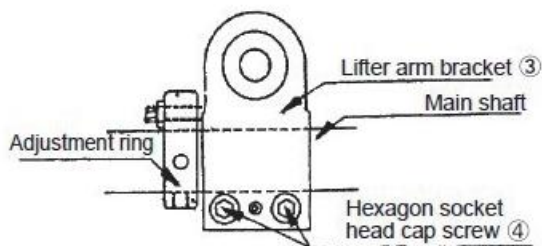
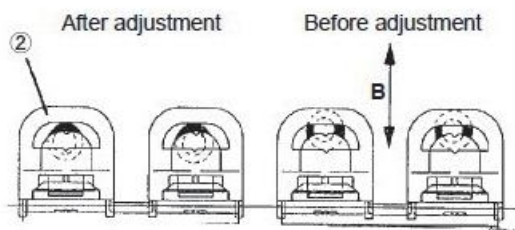
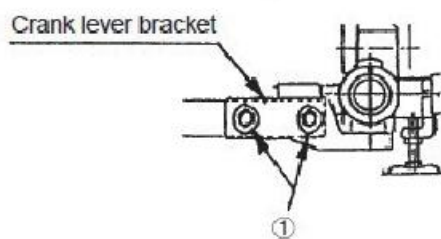
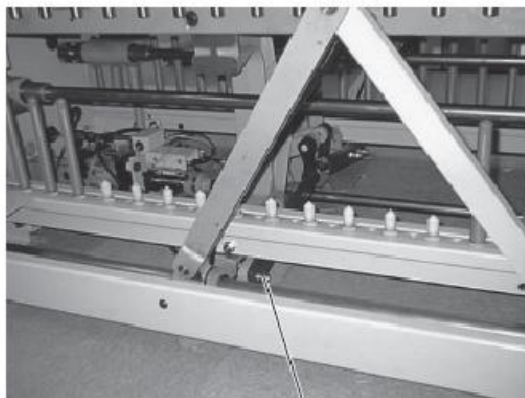
- (1) Insert an empty bobbin to a spindle.
- (2) Stop the doffing bar approx. 1 mm above the bobbin tops.



- (3) Adjust the doffing bar in the direction of arrow "A" according to the steps below so that bobbins ① come to the center of grippers ②.
 1. Loosen bolt ④.
 2. Move the doffing bar ③ by hand so that the center of bobbins ① becomes aligned with the center of grippers ②.
 3. At each of the doffing bar brackets ⑤, check the alignment of bobbins with grippers.

TIP: Distribute the error equally.
 4. Tighten bolt ④ to secure the doffing bar.
 5. This way, adjust each doffing bar.

[5.3] Adjustment of Forward and Backward Direction



- (1) Adjust the doffing bar in the same position as for the front bottom roller.
- (2) Adjust the doffing bar in direction "B".
 1. Loosen bolt ①.

TIP: To adjust, loosen one of two bolts ①.

Loosen the other bolt by 1/4 turn.
 2. Move the doffing bar in the direction of arrow "B" by hand (pull and push lightly).
 3. Adjust it so that the bobbin will be at the center of gripper ② and the distance between the front roller and the outside of the doffing bar will be 131.5 mm. Check the alignment at the doffing bar bracket.
 4. Tighten the bolt ① to fix the doffing bar.

- (3) How to adjust when the doffing bar is sharply misaligned
 1. Loosen all bolts ④ of the lifter arm bracket ③.
 2. Loosen all bolts ① of the crank lever brackets and place the doffing bar in a spontaneous state.
 3. Adjust every other doffing bars from OE to GE, tighten the bolt ① to fix them.
 4. Adjust the rest of brackets from GE to the OE.
 5. Recheck the alignment, tighten the bolt ④ and fix the doffing bars.

[6] Adjustment of Doffing Bar (Over 1200 spindles)



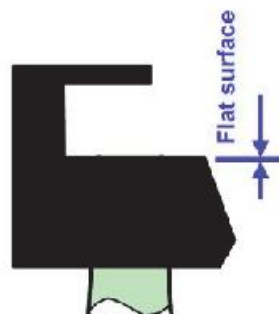
⚠ CAUTION

During adjustment work of the SCD, do not allow workers other than the persons in charge to approach the RX and SCD.

The workers in charge should observe the precautions below.

- When the doffing bar is in opening or closing operation, never let hands or a part of your body get between the RX and doffing bar.
- When the doffing bar is moving up or down, never let hands or a part of your body get under the lifter arm or the support arm.

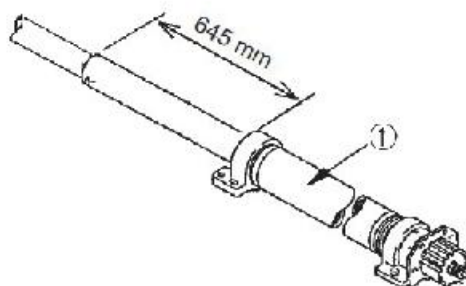
[6.1] Adjustment of Height



PA position - more than 1200 spindles

- (1) Set the doffing bar to the origin position (PA).

NOTE: If the error message “W-69A” has appeared, move the doffing bar according to the instructions given in Subsection 6B [2.5] “Doffer Motion Adjustment”.

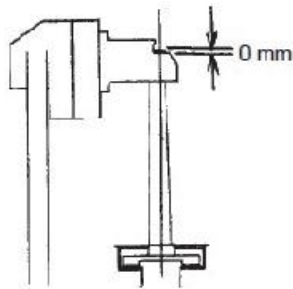
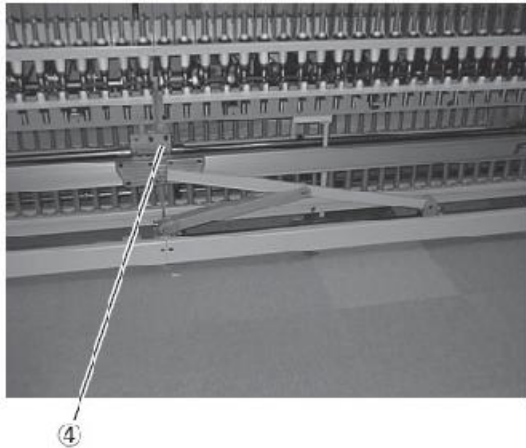
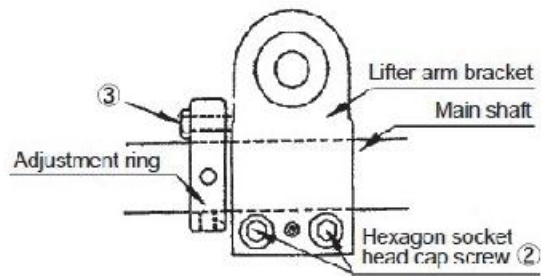


- (2) Adjust the height of doffing bar at PA position.

1. Check that the power cylinder ① is extracted by “645 mm”.

TIP: Both cylinders on the right- and left-hand sides shall be equally extracted by “645 mm”.

4B. ADJUSTMENT



2. Loosen the bolt ②.
3. Turn the adjustment bolt ③ so that the bobbin top and the gripper cap make a flat surface.

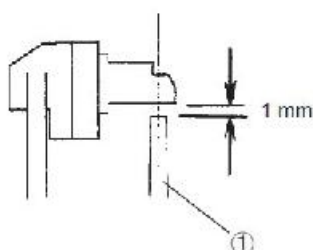
TIP: Make this adjustment at doffing bar brackets ④. Make this adjustment with the spring enabled (See 3B [11] for installing springs).

4. Following the same way, adjust the doffing bars at respective brackets ④.
5. After adjusting the height of all brackets, recheck them.
6. Tighten bolt ②.

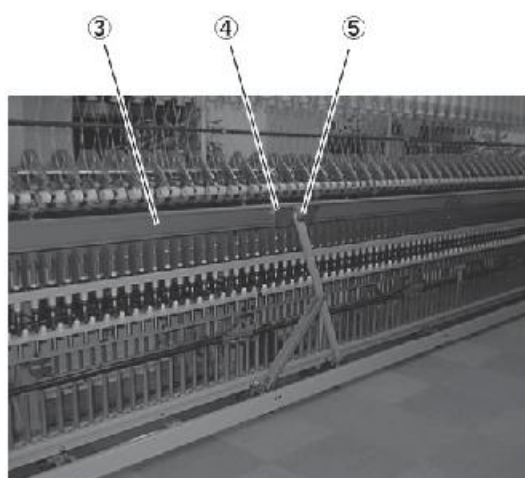
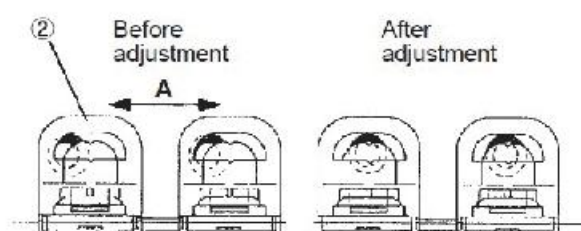
TIP: After tightening, check the height again.

NOTE: Readjust the height of doffing bar after completing all the other adjustments. Check both the PF (intermediate peg bobbin holding position) without spring enabled and the PA, and readjust it by the amount of the spring compression and the position of the lifter arm bracket.

[6.2] Right-to-Left Adjustment of the Doffing Bar



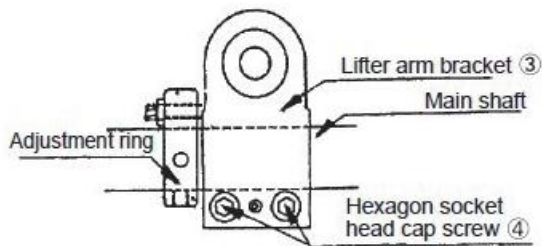
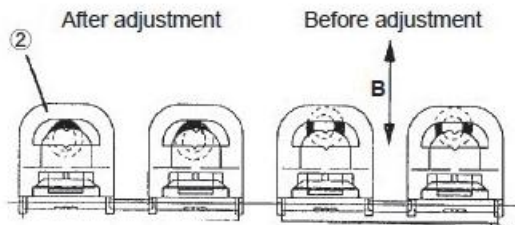
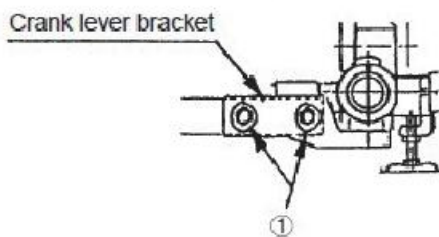
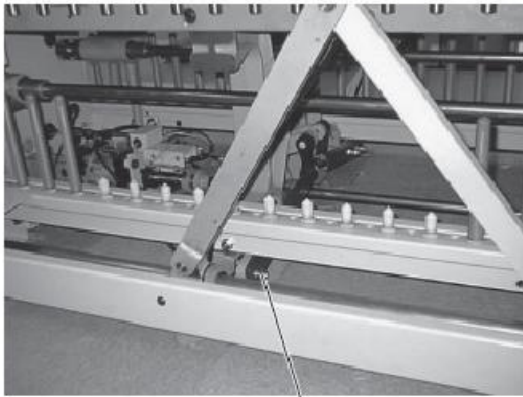
- (1) Insert an empty bobbin to a spindle.
- (2) Stop the doffing bar approx. 1 mm above the bobbin tops.



- (3) Adjust the doffing bar in the direction of arrow "A" according to the steps below so that bobbins ① come to the center of grippers ②.
 1. Loosen bolt ④.
 2. Move the doffing bar ③ by hand so that the center of bobbins ① becomes aligned with the center of grippers ②.
 3. At each of the doffing bar brackets ⑤, check the alignment of bobbins with grippers.

TIP: Distribute the error equally.
 4. Tighten bolt ④ to secure the doffing bar.
 5. This way, adjust each doffing bar.

[6.3] Adjustment of Forward and Backward Direction



- (1) Adjust the doffing bar in the same position as for the front bottom roller.
- (2) Adjust the doffing bar in direction "B".

1. Loosen bolt ①.

TIP: To adjust, loosen one of two bolts ①.

Loosen the other bolt by 1/4 turn.

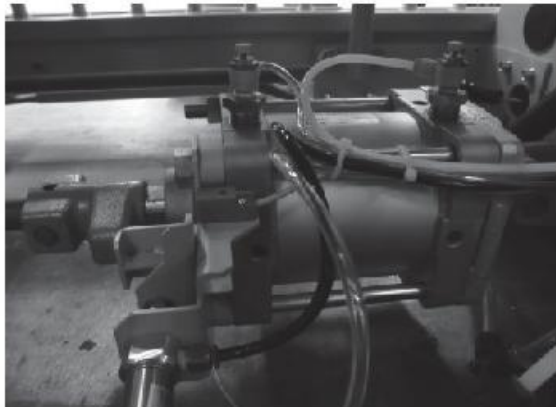
2. Move the doffing bar in the direction of arrow "B" by hand (pull and push lightly)
3. Adjust it so that the bobbin will be at the center of gripper ② and the distance between the front roller and the outside of the doffing bar will be 131.5 mm. Check the alignment at the doffing bar bracket.
4. Tighten the bolt ① to fix the doffing bar.

- (3) How to adjust when the doffing bar is sharply misaligned

1. Loosen all bolts ① of the lifter arm bracket ③.
2. Loosen all bolts ① of the crank lever brackets and place the doffing bar in a spontaneous state.
3. Adjust every other doffing bars from OE to GE, tighten the bolt ① to fix them.
4. Adjust the rest of brackets from GE to the OE.
5. Recheck the alignment, tighten the bolt ④ and fix the doffing bars.

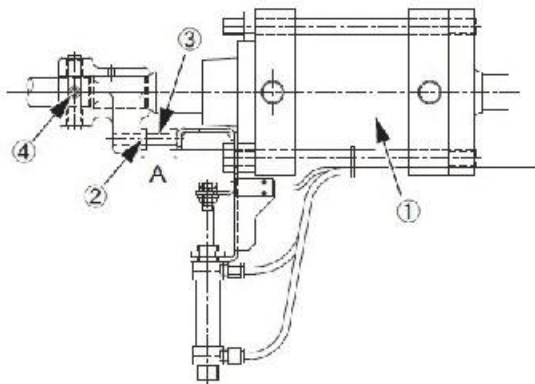
[7] Adjustment of Intermediate Pegs

[7.1] Adjusting the Angle

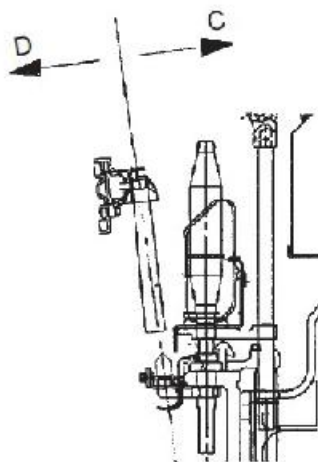


- (1) Set the adjusting bolt at the tip end of the tilting cylinder ① to dimension "A".
 1. Loosen the lock nut ②.
 2. Set to dimension "A" by turning the adjusting bolt ③.
 3. Tighten setscrew ④ for fixing. Apply thread tightener (Three Bond's 1401B) on the threaded portion.
 4. Tighten lock nut ②.

A = 32 mm



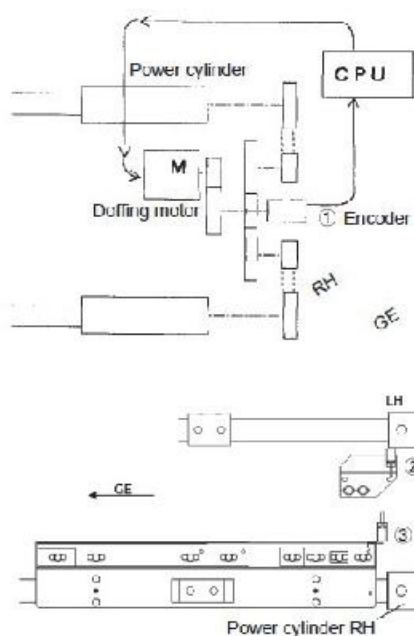
- (2) Checking the angle.
 1. Make the doffing bar grip empty bobbins and move it to the intermediate position.
 2. Check that the center of bobbins are almost aligned with intermediate pegs.
STANDARD: They should be aligned with each other so that loading bobbins onto pegs do not swing the doffing bar greatly.
 3. If fine adjustment is required, modify the dimension "A."
 - a. To move it in the direction of arrow "C", decrease "A."
 - b. To move it in the direction of arrow "D", increase "A."



- (3) Checking the centering of pegs and grippers
 Check the lengthwise centering. If necessary, adjust it by loosening the bolts that secure the intermediate peg bar.

[8] Setting of Respective Stop Positions for Doffing Bar (1200spindles or less)

[8.1] Outline of Stop Position Setting



Stop positions of the doffing bar are controlled by signals sent from the encoder ① attached to the

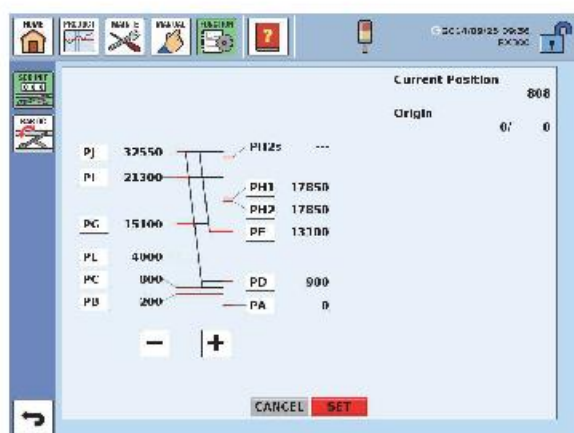
gear shaft in the doffing bar drive gear box.

The controller checks the movement range of the doffing bar, using the safety sensors ②, ③.

The basic setting for stop positions in the installation mode is required only once during installation

and not in the ordinary mode.

You can perform the position setting operation with the operation panel.

(1) Set items

(1) Positions PB through PJ are indicated by the number of pulses of the encoder, based on PA position as the origin ("0").

(2) Positions (PA through PJ) and their objectives

PA* : Origin (On-conveyer bobbin holding position)

PB : Full-bobbin yarn release position

PC : Rising and stop standby position

PD : Standby position

PE : Rising/lowering speed change point

PF : Intermediate peg bobbin holding position

PG : Intermediate peg opening/closing position

PH1 : On-spindle bobbin holding position

PH2 : Bobbin release position at the loading time to the spindles

PI : On-spindle opening/closing position, Low

PJ : On-spindle opening/closing position, High

Positions marked with an asterisk (*) represent important basic set positions in the installation mode.

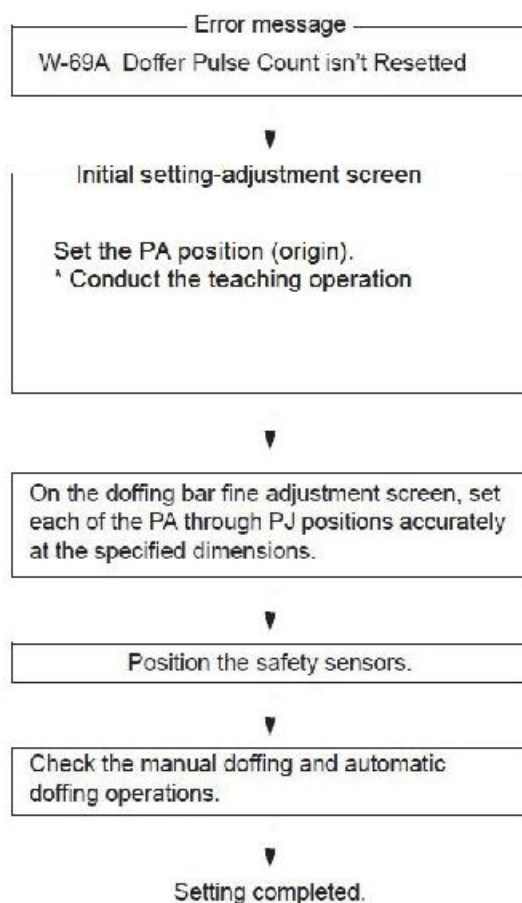
(2) Outline of setting procedures and precautions

CAUTION

As long as you have not set stop positions, you have to press the Emergency stop button or Stop switch yourself earlier to stop the doffing bar at the specified positions.

NOTE: Operation on the initial setting-adjustment screen

- The doffing bar can be operated only manually.
- The doffing bar moves up or down at low speed in all domains.
- The doffing bar will not stop at any undefined positions.



- (1) When error message W-69A is displayed, setting on the initial setting-adjustment screen is necessary. (Operation in the normal mode is not possible.) (Refer to Subsection 6B [2.4])
- (2) The initial setting-adjustment screen appears.
- (3) Move the doffing bar by manual operation to position PA.
- (4) Perform the PA position setting operation.
- (5) On the doffing bar fine adjustment screen, set each of the PA through PJ positions at the specified dimensions.
- (6) Position the safety sensors according to the set standards.
- (7) Perform manual doffing and automatic doffing several times.

[8.2] Checking before Setting Operation

CAUTION

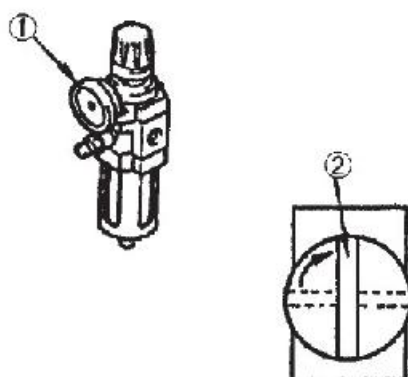
During adjustment work of the SCD, do not allow workers other than the persons in charge to approach the RX and SCD.

The workers in charge should observe the precautions below.

- When the doffing bar is in opening or closing operation, never let hands or a part of your body get between the RX and doffing bar.
- When the doffing bar is moving up or down, never let hands or a part of your body get under the lifter arm or the support arm.

- (1) Move the SCD and check that it is ready for the setting without problems.
- (2) Check the air pressure ①.

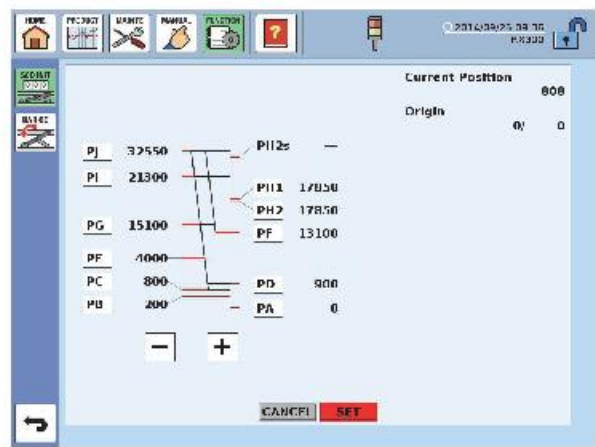
Specified pressure MPa	0.54 – 0.59
(kgf/cm ²)	5.5 – 6
Target pressure Mpa	0.56
(kgf/cm ²)	5.7



- (3) Turn the power breaker ② ON.
- (4) Error message “W-69A” is displayed.

REFERENCE: The error message cannot be reset before completing the setting of the basic stop position.

[8.3] Objectives and Adjustment Standard of Respective Stop Positions



Setting position	Adjustment standard
1 PA	Distance from the top of the gripper to the upper end of the bobbin should be 5 mm.

(1) Setting of on-tray empty bobbin holding position

2 PB	Distance from the bottom of the bobbins to the top of the trays should be 15 mm.
--------	---

(2) Setting of full bobbin yarn release position

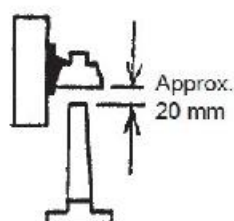
3 PC	Provide clearance between the tray or upper end of the peg and the end of the bobbin.
--------	--

(3) Setting of position for holding an empty bobbin, rising, and opening the bar
Care should be taken to keep the bobbin end from making contact with the end of the peg when the bar starts opening.

Setting position

Adjustment standard

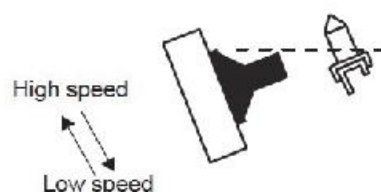
4 PD



Distance between the lower end of the gripper cap and the upper end of the bobbin should be approx. 20 mm.

- (4) Setting of standby position for closing operation after lowering

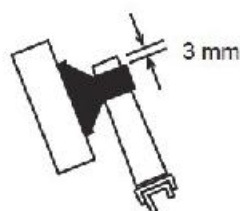
5 PE



Set the speed changing position at where the doffing bar comes next to the intermediate peg bar.

- (5) Setting of position for changing the rising/lowering speed from low to high and vice versa

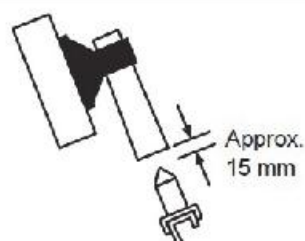
6 PF



Distance from the gripper top surface to the upper end of the bobbin should be 3 mm.

- (6) Setting of bobbin holding position on the intermediate peg

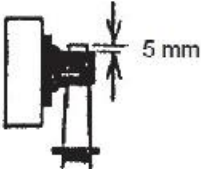
7 PG



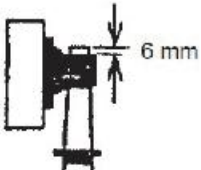
Distance between the end of the bobbin in holding and the end of the peg should be approx. 15 mm.

- (7) Setting of position for closing operation at an intermediate position after holding the bobbin and rising

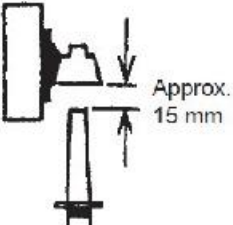
4B. ADJUSTMENT

Setting position	Adjustment standard
8 PH1	 Distance from the top of the gripper to the upper end of the bobbin should be 5 mm.

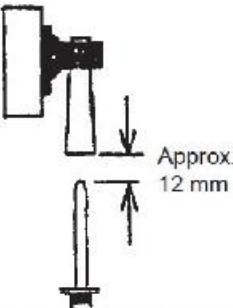
(8) Setting of the bobbin holding position after it is inserted into the spindle

9 PH2	 Distance from the top of the gripper to the upper end of the bobbin should be 6 mm.
---------	--

(9) Setting of the bobbin release position at the loading time to the spindles

10 PI	 Distance between the lower end of the gripper cap and the upper end of the bobbin should be approx. 15 mm.
---------	---

(10) Setting of position at which the bar changes to low speed at the closing position above the spindle after lowering from the highest position

11 PJ	 Distance between the end of the bobbin in holding and the end of the spindle should be approx. 12 mm.
---------	--

(11) Setting of the highest rising position of the bar

[8.4] Origin Setting on the Initial Setting-adjustment Screen

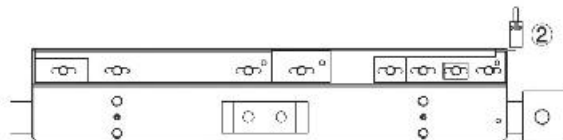
Set the PA origin position.

CAUTION

In the installation mode, move the doffing bar by inching operation.

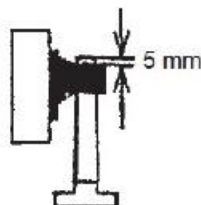
When moving the doffing bar in the installation mode, be sure to inch the SCD to the set position. Avoid excessive up- or down-operation.

REFERENCE: The origin setting on the initial setting-adjustment screen is basically made only once at the time of installation, and is not performed in normal state.



- (1) Check that the screen at left is displayed. (Refer to Subsection 6B [2.4] for the screen display method.)
- (2) Move the doffing bar manually to the on-tray empty-bobbin holding position (PA) as shown at left according to the steps below.
 1. Press the doffing bar up or down switch ①.
 2. Immediately before the doffing bar reaches the desired set position, press the Stop switch or the Emergency stop button to stop the doffing bar.

NOTE: While making a safety check around the SCD, move the doffing bar by inching.
 3. Make sure that the safety sensor PRS21 ② is ON.

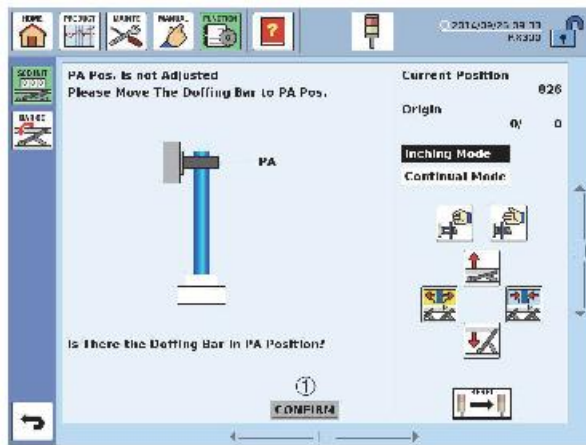


Set the distance from the top of the grippers to that of the bobbins to 5 mm.

- (3) As in the figure on the left, check that the gripper position is about 5 mm.

REFERENCE: If you cannot set the distance to 5 mm, make temporary setting at this step. After completion of this procedure, make fine adjustment referring to Subsection 6B [2.5].

4B. ADJUSTMENT



- (4) Touch [CONFIRM] switch ①.



- (5) The safety sensor (PRS21) adjustment check screen appears.
Check adjustment of the safety sensor (PRS21) and touch [CONFIRM].

Fig.1 PRS21 check screen



- (6) The teaching start screen appears.
Touch [START] to start teaching operation.
※In the teaching operation repeat automatic up and down movements between PA and PC several times to obtain overrun at each position beforehand.
※Start operation after checking safety without any obstacle. If any abnormality occurs, stop the operation by pressing the emergency stop switch.

Fig.2 Teaching start screen



Fig.3 Teaching in progress screen



Fig.4 PA position adjustment completion screen

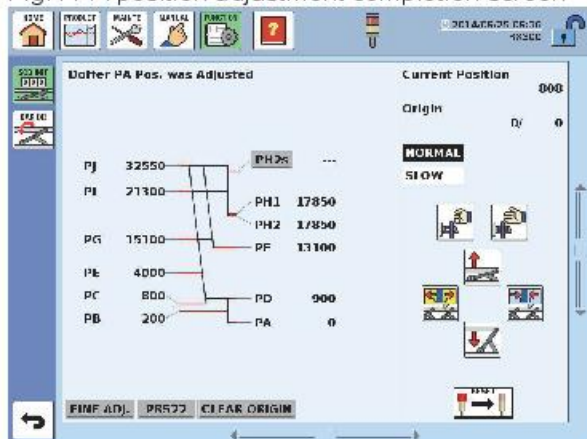


Fig.5 Doffer adjustment screen

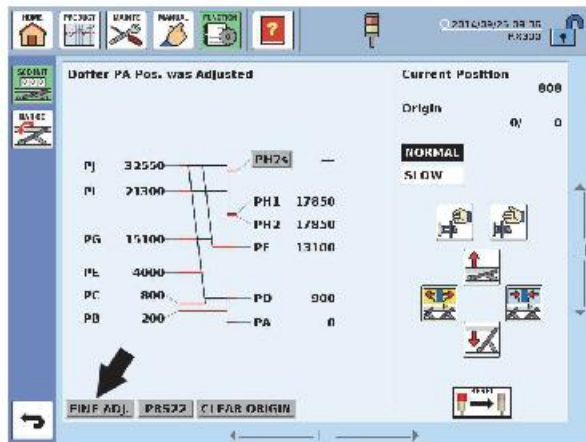
- (7) The screen display is as shown in Fig. 3 during teaching operation. Do not touch the screen in this period.

- (8) The screen display changes as shown in Fig.4 upon completion of teaching. Touch [CONFIRM] to display the doffer position adjustment screen (Fig. 5).

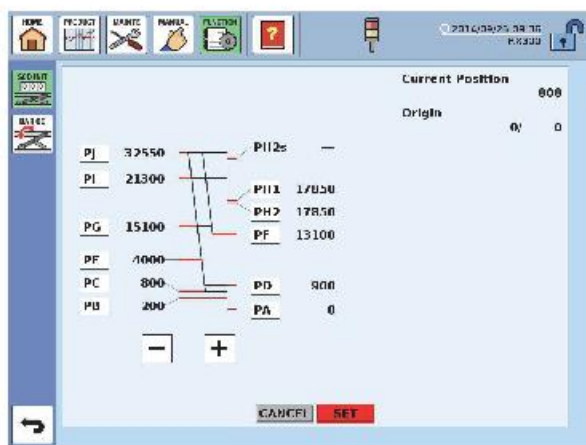
NOTE: If any trouble occurs during teaching, correct the trouble and repeat PA origin adjustment.

- (9) After adjusting the PA origin, make fine adjustment of each stopping position. (Refer to Subsection 6B [2.5](3).)

[8.5] Fine Adjustment of Doffing Bar Stop Positions



- (1) Turn the 3-position key switch to the DATA SET position.
- (2) Touch [FUNCTION] – [Initial Setting-Adjustment] – [Adjusting of Doffer Motion] to open the screen. (Refer to Subsection 6B [2.4])
- (3) Touch the [FINE ADJ.] switch to open the fine adjustment screen.



- (4) Press the box of the item desired for fine adjustment.
- (5) Move the doffing bar to the stop position to be adjusted.
- (6) Touch the + or – key to adjust the bar height.

REFERENCE: The table given at left shows the number of pulses required for 1-mm movement of the doffing bar.

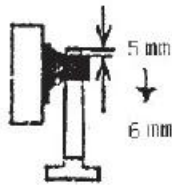
- (7) After inputting the required adjustment value, touch the [SET] switch.

Number of pulses for 1-mm movement of doffing bar

	Number of pulses for 1-mm
PA position	13 pulses
PF position	50 pulses
PH position	65 pulses

[8.6] Fine Adjustment Example of Doffing Bar Stop Position

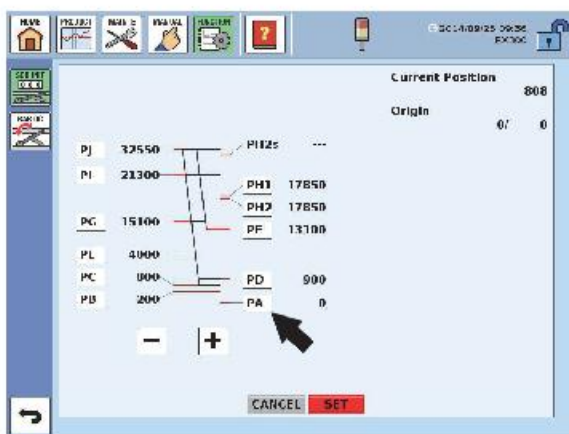
- (1) Lowering the PA position (empty bobbinholding position on conveyer)by 1 mm



From the top of the gripper to the upper end of the bobbin

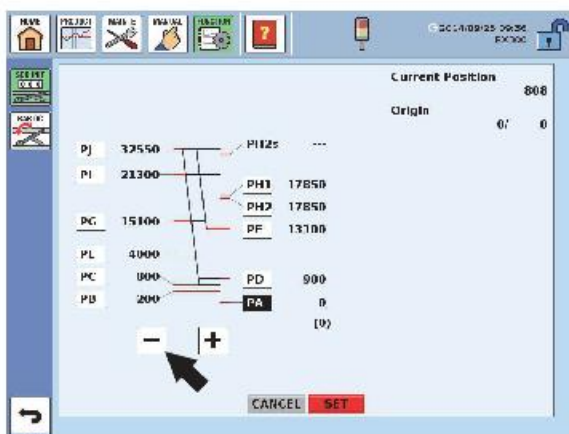
- (1) Perform steps (1) through (6) given in Subsection 4B.7A.5.

- (2) Touch PA on the screen.

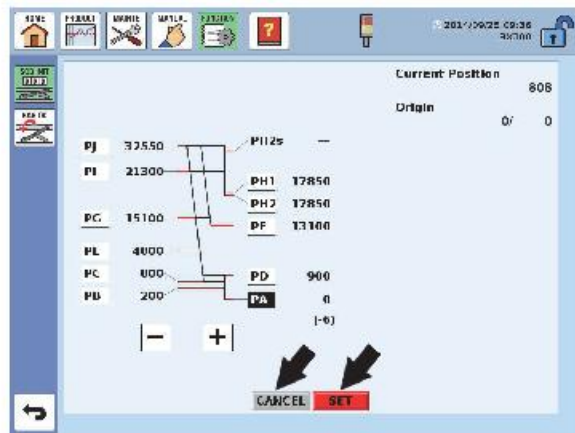


- (3) Touch the — key five times.
Movement: $0.2 \text{ mm} \times 5 \text{ times} = 1.0 \text{ mm}$

NOTE: If the [SET] switch has not been pressed, press the [CANCEL] switch to return to (2) above.



4B. ADJUSTMENT



- (4) Press the [SET] switch.

NOTE: If the [SET] switch has been pressed, return to (1).

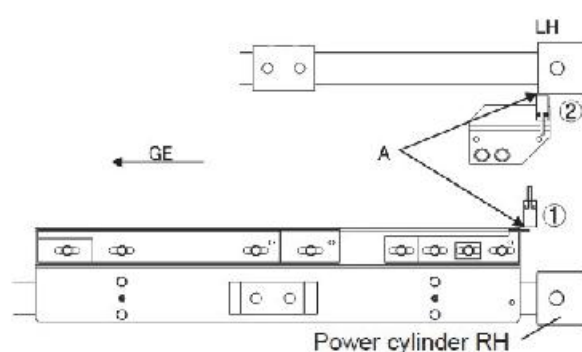
- (5) Move the doffing bar up and down a few times and check whether the doffing bar stops at the adjusted stop position.

NOTE: For bar operation, set the manual operation switch on the screen to display the SCD manual operation screen for operation.

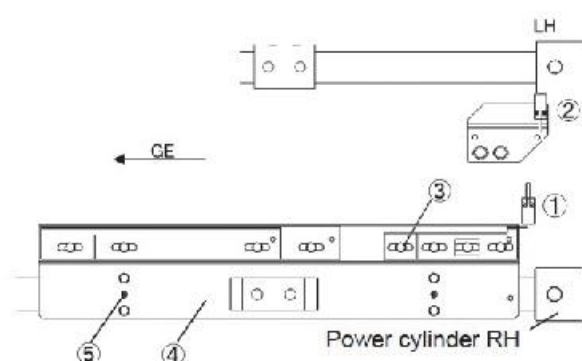
- (6) To adjust the position again or to adjust other stop positions, repeat steps (1) through (5) above.

[8.7] Positioning the Safety Sensors

If the doffing bar moves exceeding the pulse set values due to any problem, the safety sensors go OFF to signal the controller to stop the doffing bar, preventing accidents.



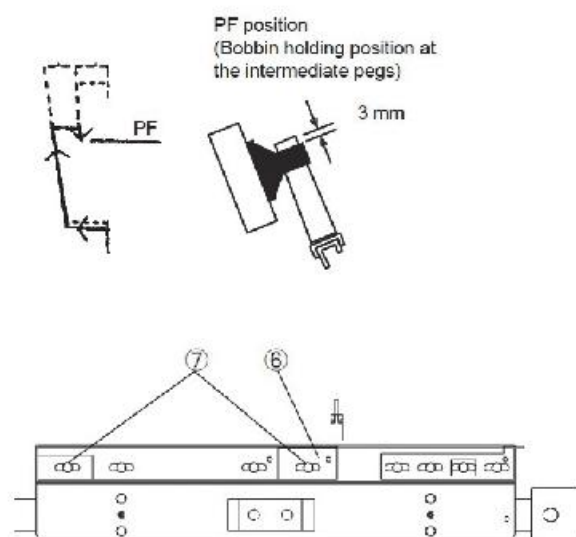
- (1) Adjust the gap "A" between sensor ① and its detection object and between sensor and its detection object to 1.5 to 2.0 mm, by loosening the bolts on the sensor ② brackets and moving those brackets.



- (2) Temporarily install each detection plate so that the fixing bolt comes to the center of the slot ③.
- (3) Move the doffing bar to the PA position (Onconveyer bobbin holding position).
- (4) Adjust and secure the RH detection plate ④ in the following way:
 1. Loosen bolts ⑤.
 2. Move the detection plate ④ in the direction of the arrow shown at left. Stop the plate the moment the indicator lamp of the sensor ① comes ON.
 3. Tighten bolts ⑤.

- (5) Check that the LH sensor ② comes ON when the doffing bar moves down from the PC position to the PA position.
If any adjustment is required, move the sensor bracket.

NOTE: LH sensor ② transition point from OFF to ON is applied as the reference point for doffing operation. If you move the sensor bracket after automatic operation, open the installation mode screen and clear the reference point of PRS22.

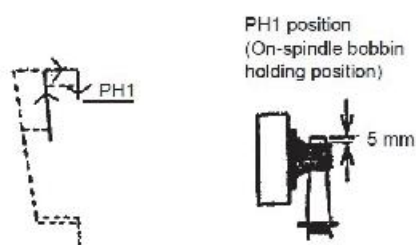


- (6) Move the doffing bar to the PF position (Bobbin holding position at the intermediate pegs).

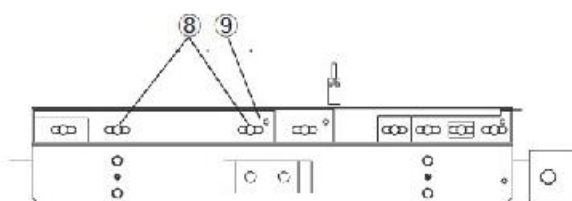
- (7) Adjust and secure the detection plate ⑥ in the following way:
1. Loosen bolts ⑦.
 2. Move the detection plate ⑥ in the direction of the arrow shown at left. Stop the plate the moment the indicator lamp of the sensor comes ON.
 3. Tighten bolts ⑦.

ADJUSTMENT CRITERIA:

Adjust the detection plate so that the sensor always goes OFF if the doffing bar moves down below the PF position by 2 mm or more.



- (8) Move the doffing bar to the PH1 position (Onspindle bobbin holding position).



- (9) Adjust and secure the detection plate ⑨ in the following way:
1. Loosen bolts ⑧.
 2. Move the detection plate ⑨ in the direction of the arrow shown at left. Stop the plate the moment the indicator lamp of the sensor comes ON.
 3. Tighten bolts ⑧.

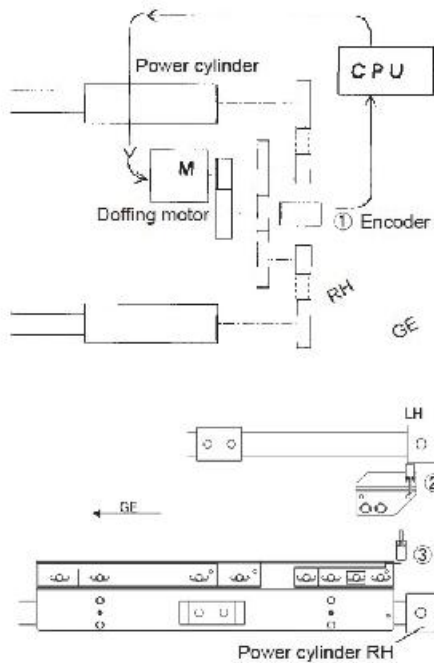
ADJUSTMENT CRITERIA:

Adjust the detection plate so that the sensor always goes OFF if the doffing bar moves down below the PH1 position by 2 mm or more.

- (10) Check the doffing operation two or three times. If it is normal, the sensor positioning is completed.

[9] Setting of Respective Stop Positions for Doffing Bar (Over 1200 spindles)

[9.1] Outline of Stop Position Setting



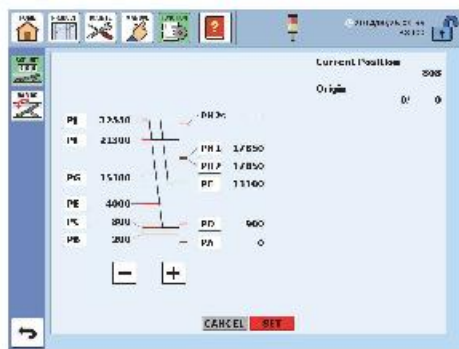
Stop positions of the doffing bar are controlled by signals sent from the encoder ① attached to the

gear shaft in the doffing bar drive gear box.

The controller checks the movement range of the doffing bar, using the safety sensors ②, ③.

The basic setting for stop positions in the installation mode is required only once during installation and not in the ordinary mode.

You can perform the position setting operation with the operation panel.

(1) Set items

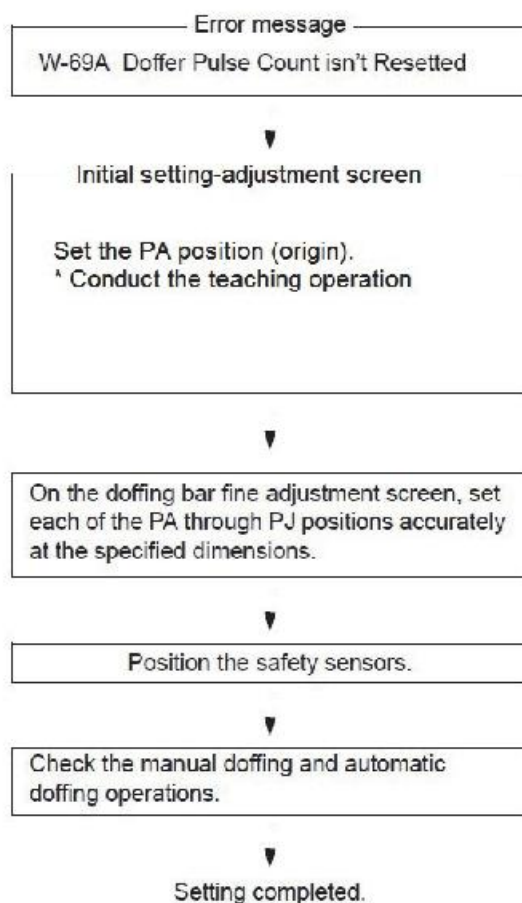
- (1) Positions PB through PJ are indicated by the number of pulses of the encoder, based on PA position as the origin ("0").
 - (2) Positions (PA through PJ) and their objectives
 - PA* : Origin
 - PB : Full-bobbin yarn release position
 - PC : Rising and stop standby position
 - PD : Standby position
 - PE : Rising/lowering speed change point
 - PF : Intermediate peg bobbin holding release position
 - PG : Intermediate peg opening/closing position
 - PH1 : On-spindle bobbin holding position
 - PH2 : Bobbin release position at the loading time to the spindles
 - PI : On-spindle opening/closing position, Low
 - PJ : On-spindle opening/closing position, High
- Positions marked with an asterisk (*) represent important basic set positions in the installation mode.

(2) Outline of setting procedures and precautions**⚠ CAUTION**

As long as you have not set stop positions, you have to press the Emergency stop button or Stop switch yourself earlier to stop the doffing bar at the specified positions.

NOTE: Operation on the initial setting-adjustment screen

- The doffing bar can be operated only manually.
- The doffing bar moves up or down at low speed in all domains.
- The doffing bar will not stop at any undefined positions.



- (1) When error message W-69A is displayed, setting on the initial setting-adjustment screen is necessary. (Operation in the normal mode is not possible.) (Refer to Subsection 6B [2.4])
- (2) The initial setting-adjustment screen appears.
- (3) Move the doffing bar by manual operation to position PA.
- (4) Perform the PA position setting operation.
- (5) On the doffing bar fine adjustment screen, set each of the PA through PJ positions at the specified dimensions.
- (6) Position the safety sensors according to the set standards.
- (7) Perform manual doffing and automatic doffing several times.

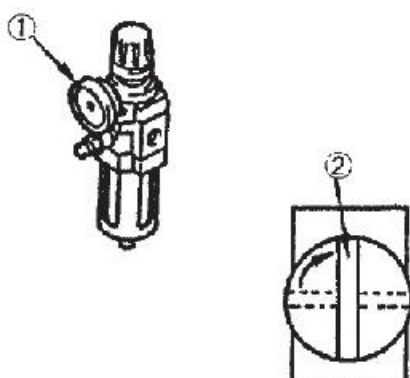
[9.2] Checking before Setting Operation

CAUTION

During adjustment work of the SCD, do not allow workers other than the persons in charge to approach the RX and SCD.

The workers in charge should observe the precautions below.

- When the doffing bar is in opening or closing operation, never let hands or a part of your body get between the RX and doffing bar.
- When the doffing bar is moving up or down, never let hands or a part of your body get under the lifter arm or the support arm.



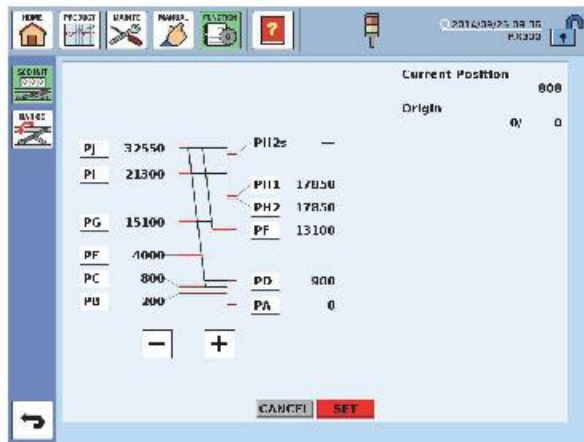
- (1) Move the SCD and check that it is ready for the setting without problems.
- (2) Check the air pressure ①.

Specified pressure MPa	0.54 – 0.59
(kgf/cm ²)	5.5 – 6
Target pressure Mpa	0.56
(kgf/cm ²)	5.7

- (3) Turn the power breaker ② ON.
- (4) Error message “W-69A” is displayed.

REFERENCE: The error message cannot be reset before completing the setting of the basic stop position.

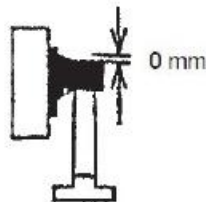
[9.3] Objectives and Adjustment Standard of Respective Stop Positions



(1) Setting of PA position (origin)

Setting position Adjustment standard

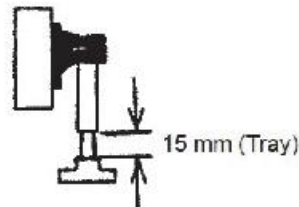
1 | PA



The top of the gripper and the upper end of the bobbin should make a flat surface.

(2) Setting of full bobbin yarn release position

2 | PB

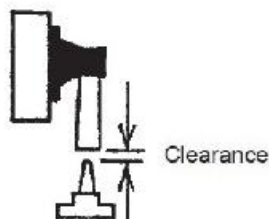


Distance from the bottom of the bobbins to the top of the trays should be 15 mm.

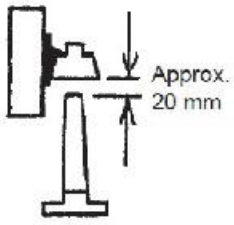
(3) Setting of position for holding an empty bobbin, rising, and opening the bar

Care should be taken to keep the bobbin end from making contact with the end of the peg when the bar starts opening.

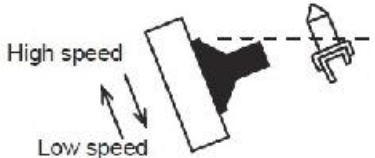
3 | PC



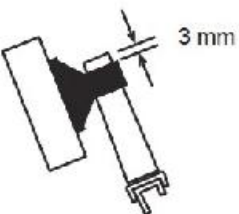
Provide clearance between the tray or upper end of the peg and the end of the bobbin.

Setting position	Adjustment standard
4 PD	 Approx. 20 mm Distance between the lower end of the gripper cap and the upper end of the bobbin should be approx. 20 mm.

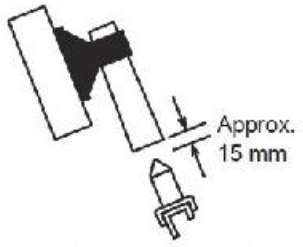
- (4) Setting of standby position for closing operation after lowering

5 PE	 High speed Low speed Set the speed changing position at where the doffing bar comes next to the intermediate peg bar.
------	--

- (5) Setting of position for changing the rising/lowering speed from low to high and vice versa

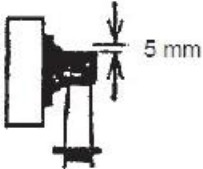
6 PF	 3 mm Distance from the gripper top surface to the upper end of the bobbin should be 3 mm.
------	---

- (6) Setting of bobbin holding position on the intermediate peg

7 PG	 Approx. 15 mm Distance between the end of the bobbin in holding and the end of the peg should be approx. 15 mm.
------	---

- (7) Setting of position for closing operation at an intermediate position after holding the bobbin and rising

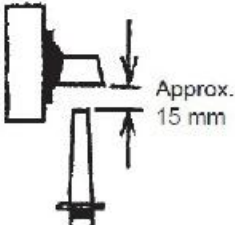
4B. ADJUSTMENT

Setting position	Adjustment standard
8 PH1	 Distance from the top of the gripper to the upper end of the bobbin should be 5 mm.

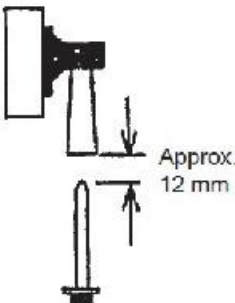
- (8) Setting of the bobbin holding position after it is inserted into the spindle

9 PH2	 Distance from the top of the gripper to the upper end of the bobbin should be 6 mm.
-------	--

- (9) Setting of the bobbin release position at the loading time to the spindles

10 PI	 Distance between the lower end of the gripper cap and the upper end of the bobbin should be approx. 15 mm.
-------	---

- (10) Setting of position at which the bar changes to low speed at the closing position above the spindle after lowering from the highest position

11 PJ	 Distance between the end of the bobbin in holding and the end of the spindle should be approx. 12 mm.
-------	--

- (11) Setting of the highest rising position of the bar

[9.4] Origin Setting on the Initial Setting-adjustment Screen

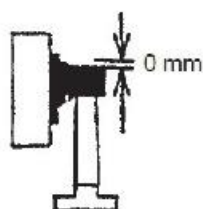
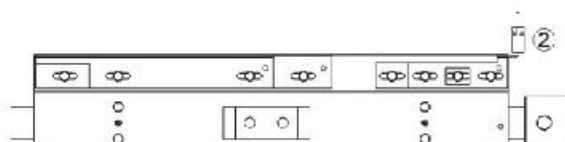
Set the PA position (origin).

CAUTION

In the installation mode, move the doffing bar by inching operation.

When moving the doffing bar in the installation mode, be sure to inch the SCD to the set position. Avoid excessive up- or down-operation.

REFERENCE: The origin setting on the initial setting-adjustment screen is basically made only once at the time of installation, and is not performed in normal state.



The top of the gripper and the top end of the bobbin make a flat surface

- (1) Check that the screen at left is displayed. (Refer to Subsection 6B [2.4] for the screen display method.)
- (2) Move the doffing bar manually to the on-tray empty-bobbin holding position (PA) as shown at left according to the steps below.
 1. Press the doffing bar up or down switch ①.
 2. Immediately before the doffing bar reaches the desired set position, press the Stop switch or the Emergency stop button to stop the doffing bar.

NOTE: While making a safety check around the SCD, move the doffing bar by inching.
 3. Make sure that the safety sensor PRS21 ② is ON.

- (3) Make sure that the top of the gripper and the top end of the bobbin make a flat surface (see the figure on the left).

REFERENCE: If you cannot set the distance to 5 mm, make temporary setting at this step. After completion of this procedure, make fine adjustment referring to Subsection 6B [2.5].

4B. ADJUSTMENT



- (4) Touch [CONFIRM] switch ①.



- (5) The safety sensor (PRS21) adjustment check screen appears.
Check adjustment of the safety sensor (PRS21) and touch [CONFIRM].

Fig.1 PRS21 check screen



- (6) The teaching start screen appears.
Touch [START] to start teaching operation.

NOTE: In the teaching operation repeat automatic up and down movements between PA and PC several times to obtain overrun at each position beforehand.

NOTE: Start operation after checking safety without any obstacle. If any abnormality occurs, stop the operation by pressing the emergency stop switch.

Fig.2 Teaching start screen



Fig.3 Teaching in progress screen



Fig.4 PA position adjustment completion screen

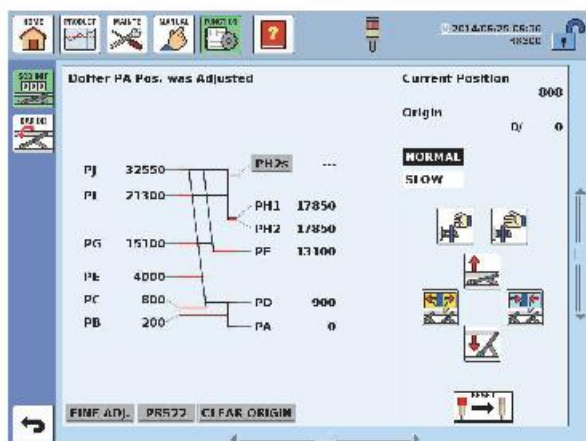


Fig.5 Doffer adjustment screen

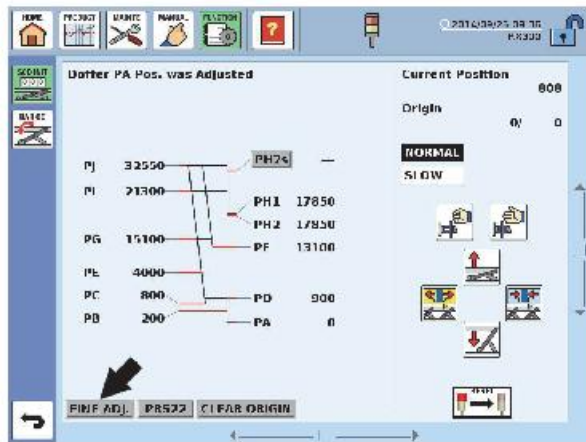
- (7) The screen display is as shown in Fig. 3 during teaching operation. Do not touch the screen in this period.

- (8) The screen display changes as shown in Fig.4 upon completion of teaching. Touch [CONFIRM] to display the doffer position adjustment screen (Fig. 5).

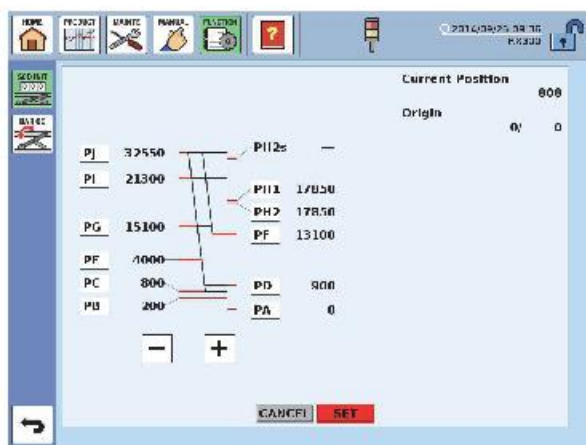
NOTE: If any trouble occurs during teaching, correct the trouble and repeat PA origin adjustment.

- (9) After adjusting the PA origin, make fine adjustment of each stopping position. (Refer to Subsection 6B [2.5 3].)

[9.5] Fine Adjustment of Doffing Bar Stop Positions



- (1) Turn the 3-position key switch to the DATA SET position.
- (2) Touch [FUNCTION] – [Initial Setting-Adjustment] – [Adjusting of Doffer Motion] to open the screen. (Refer to Subsection 6B [2.4])
- (3) Touch the [FINE ADJ.] switch to open the fine adjustment screen.



- (4) Press the box of the item desired for fine adjustment.
- (5) Move the doffing bar to the stop position to be adjusted.
- (6) Touch the + or – key to adjust the bar height.

REFERENCE: The table given at left shows the number of pulses required for 1-mm movement of the doffing bar.

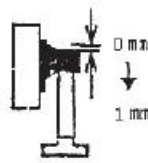
- (7) After inputting the required adjustment value, touch the [SET] switch.

Number of pulses for 1-mm movement of doffing bar

PA position	13 pulses
PF position	50 pulses
PH position	65 pulses

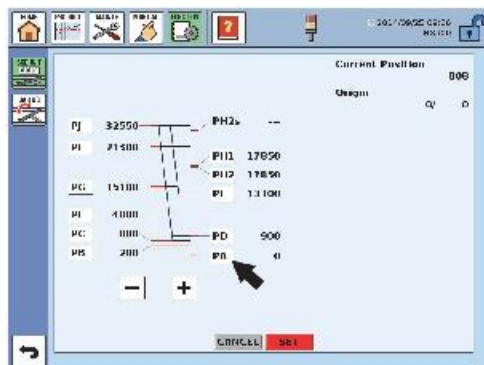
[9.6] Fine Adjustment Example of Doffing Bar Stop Position

(1) Lowering the PA position by 1 mm

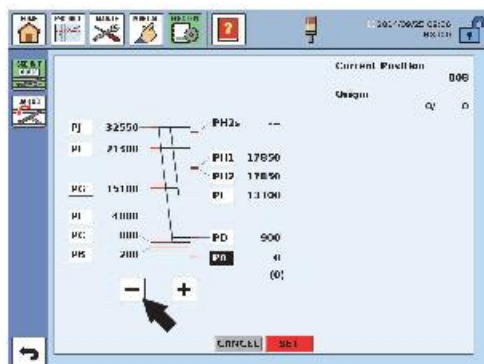


From the top of the gripper to the upper end of the bobbin

- (1) Perform steps (1) through (6) given in Subsection 4B.7A.5.

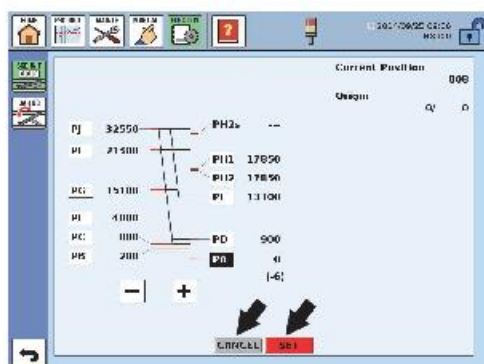


- (2) Touch PA on the screen.



- (3) Touch the — key five times.
Movement: $0.2 \text{ mm} \times 5 \text{ times} = 1.0 \text{ mm}$

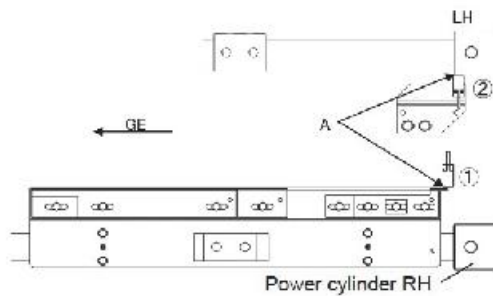
NOTE: If the [SET] switch has not been pressed, press the [CANCEL] switch to return to (2) above.



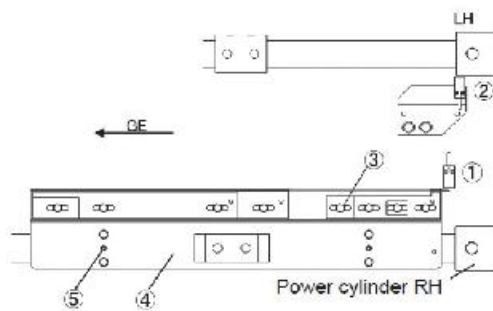
- (4) Press the [SET] switch.
NOTE: If the [SET] switch has been pressed, return to (1).
- (5) Move the doffing bar up and down a few times and check whether the doffing bar stops at the adjusted stop position.
NOTE: For bar operation, set the manual operation switch on the screen to display the SCD manual operation screen for operation.
- (6) To adjust the position again or to adjust other stop positions, repeat steps (1) through (5) above.

[9.7] Positioning the Safety Sensors

If the doffing bar moves exceeding the pulse set values due to any problem, the safety sensors go OFF to signal the controller to stop the doffing bar, preventing accidents.



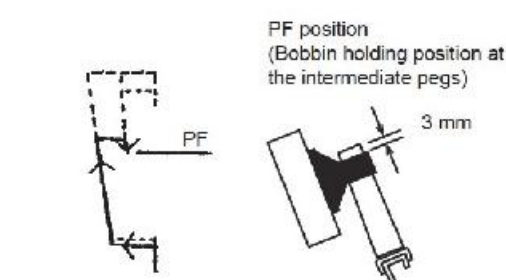
- (1) Adjust the gap "A" between sensor ① and its detection object and between sensor ② and its detection object to 1.5 to 2.0 mm, by loosening the bolts on the sensor brackets and moving those brackets.



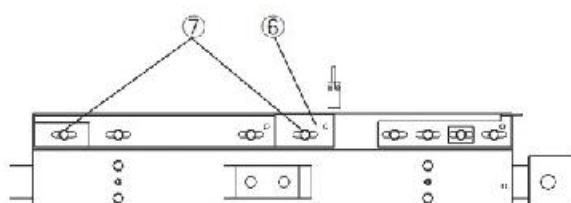
- (2) Temporarily install each detection plate so that the fixing bolt comes to the center of the slot ③.
- (3) Move the doffing bar to the stopper holding position (bobbin holding position).
- (4) Adjust and secure the RH detection plate ④ in the following way:
 1. Loosen bolts ⑤.
 2. Move the detection plate ④ in the direction of the arrow shown at left. Stop the plate the moment the indicator lamp of the sensor ① comes ON.
 3. Tighten bolts ⑤.

- (5) Check that the LH sensor ② comes ON when the doffing bar moves down from the PC position to the PA position. If any adjustment is required, move the sensor bracket.

NOTE: LH sensor ② transition point from OFF to ON is applied as the reference point for doffing operation. If you move the sensor bracket after automatic operation, open the installation mode screen and clear the reference point of PRS22.



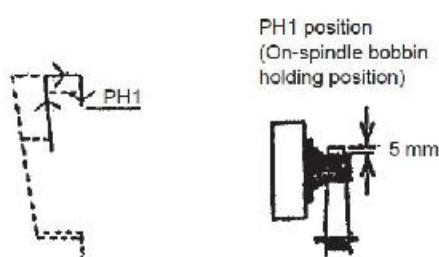
- (6) Move the doffing bar to the PF position (Bobbin holding position at the intermediate pegs).



- (7) Adjust and secure the detection plate ⑥ in the following way:
1. Loosen bolts ⑦.
 2. Move the detection plate ⑥ in the direction of the arrow shown at left. Stop the plate the moment the indicator lamp of the sensor comes ON.
 3. Tighten bolts ⑦.

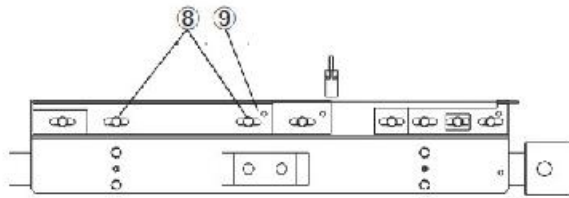
ADJUSTMENT CRITERIA:

Adjust the detection plate so that the sensor always goes OFF if the doffing bar moves down below the PF position by 2 mm or more.



- (8) Move the doffing bar to the PH1 position (Onspindle bobbin holding position).

4B. ADJUSTMENT



(9) Adjust and secure the detection plate ⑨ in the following way:

1. Loosen bolts ⑧.
2. Move the detection plate ⑨ in the direction of the arrow shown at left. Stop the plate the moment the indicator lamp of the sensor comes ON.
3. Tighten bolts ⑧.

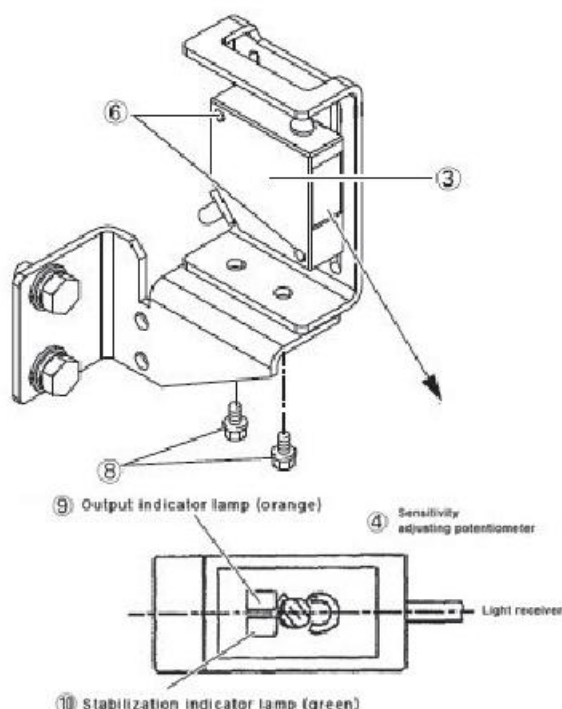
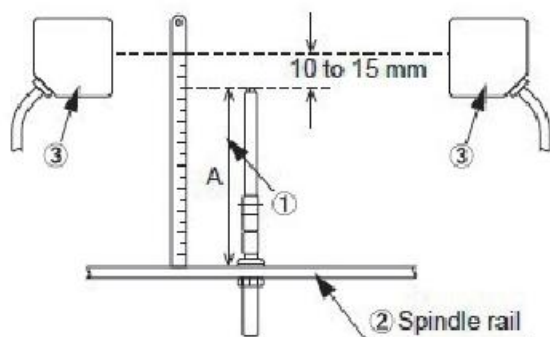
ADJUSTMENT CRITERIA:

Adjust the detection plate so that the sensor always goes OFF if the doffing bar moves down below the PH1 position by 2 mm or more.

- (10) Check the doffing operation two or three times. If it is normal, the sensor positioning is completed.

[10] Adjustment of Photocell Switch for Detecting Full Bobbins Remaining without Being Removed

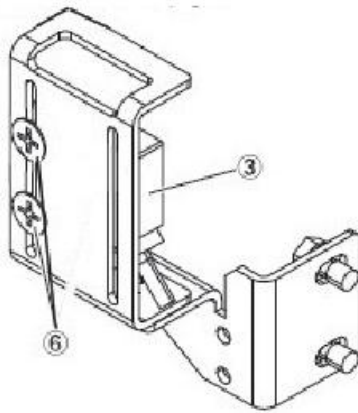
Adjust this sensor when the doffing bar is closed on the medium peg (PG position)



- (1) Remove all bobbins on spindle ①.
- (2) Adjust the photocell switch ③ position to allow the passing of optical axis 10 to 15 mm above the end of the spindle ①.
 1. Loosen bolt ⑥ of photocell switch ③.
 2. Measure the distance between the top surface of the spindle rail ② and the end of the spindle ① (dimension "A").
 3. Set the center of the photocell switch ③ to "A mm + 10 to 15 mm".
 4. Tighten bolts ⑥ to fix.

TIP: Fix the photocell switch ensuring that the photocell switch ③ does not tilt.
5. Following the same procedures, adjust four locations (GE and OE on RH and LH sides) (eight locations for the 3-head version).

4B. ADJUSTMENT



- (3) Set the sensitivity adjusting potentiometer ④ of the light receiver-side photoelectric switch ③ to the maximum position.
- (4) Adjust the optical axis.

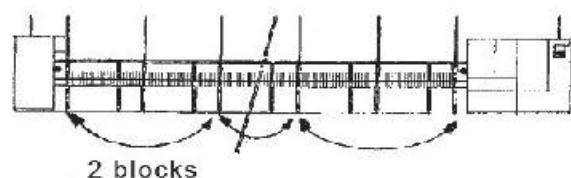
1. Place an projector and a light receiver in opposition linearly and fasten bolt ⑧ temporarily.
2. Swing the projector slowly to the left and right, and check the incidence range of the illumination by means of the light receiver stabilization indicator lamp (green).

TIP : In the illuminated state, the stabilization indicator lamp ⑩ (green) is turned on, and the output indicator lamp (orange) goes off.

3. Fix the photocell switch with bolt ⑧ at about the center of the range of illumination checked.
4. Likewise, adjust the switch in vertical direction by loosening bolts ⑥.
5. Make sure that the stabilization indicator lamp ⑩ (green) is on.

REFERENCE: The green indicator is turned off when the Incoming light quantity is insufficient (instable range).

6. When the stabilization indicator lamp ⑩ (green) is off, conduct (6) "Adjustment when the stabilization indicator lamp ⑩ (green) is off".



2 blocks

(5) Checking of optical axis

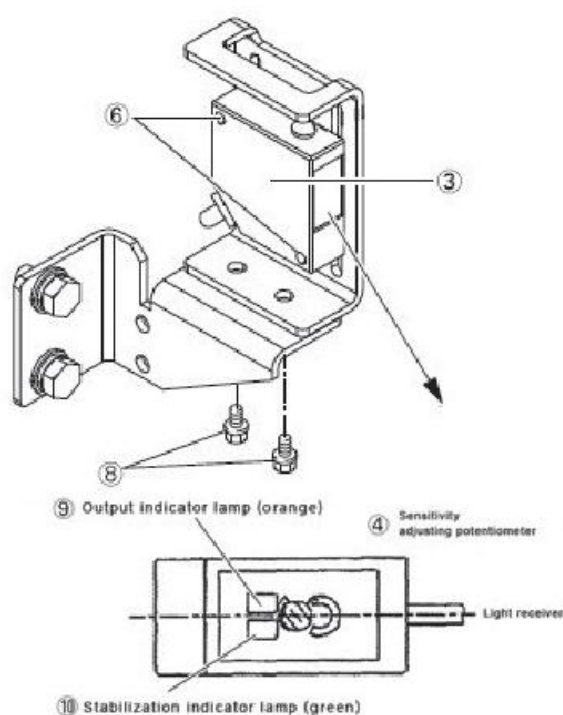
1. Set an empty bobbin onto the spindles, and check lighting of the output indicator lamp ⑨ (orange).

	State of output indicator lamp (orange)	State of stabilization indicator lamp (green)
At the bobbin insertion	Turns ON	Turns ON
At the bobbin removal	Turns OFF	Turns ON

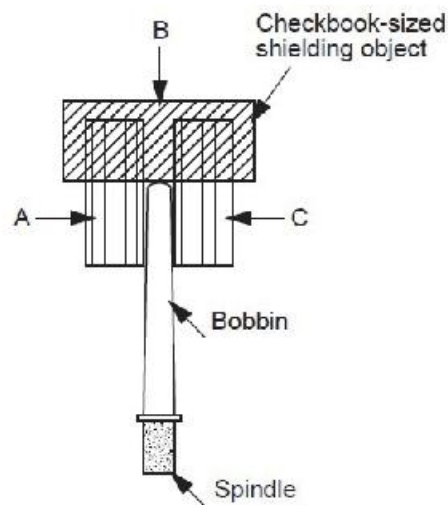
2. After confirming the operation of the output indicator lamp ⑨ (orange), insert an empty bobbin into the spindle two blocks ahead and check the lighting of the output indicator lamp ⑨ (orange) in the same way.

Repeat this step thereafter.

3. Likewise check both right- and left-hand sides.
4. Check that the stabilization indicator lamp (green) turns on regardless of bobbin existence.



4B. ADJUSTMENT



- (6) Adjustment when the stabilization indicator lamp ⑩ (green) is off:
1. Arrange for a shielding object of a size of a checkbook.
 2. Shield the lighting at respective malfunctioning positions of “A, B, and C” and check the direction of decentering of the optical axis.
TIP: Check the position where the output indicator lamp ⑨ (orange) comes on among positions A, B, and C.
 3. Adjust the orientation of the projector to align the optical axis.
 4. Check the optical axis again.

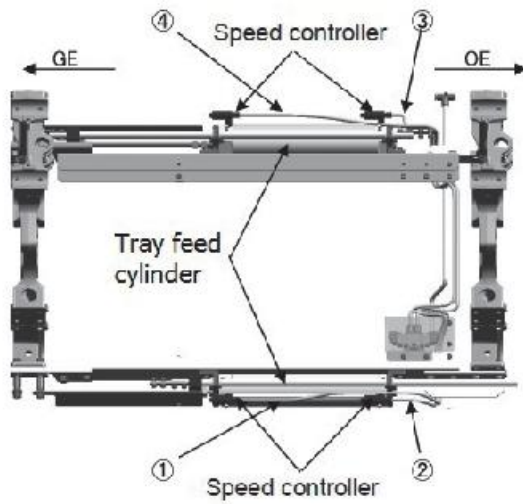
REFERENCE: Added an indicator lamp list.

		Stabilization indicator lamp ⑩ (green)	
		ON	OFF
Output indicator lamp ⑨ (orange)	ON	Light shielding with stabilization	Unstable light shielding
	OFF	Stabilized incoming light quantity	Instable incoming light quantity (Instable range)

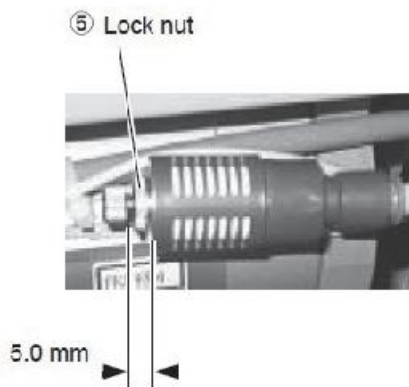
REFERENCE: Status of the tower lamp
Since the tower lamp (yellow) blinks when the output indicator lamp ⑨ (orange) is on, you can check the output with the tower lamp when you are away from the light receiver.

[11] Adjustment of Peg Tray Related Components

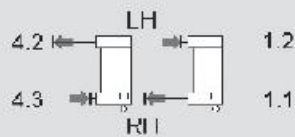
[11.1] Adjustment of Tray Feed Cylinder Speed



- (1) Adjust the tray cylinder speed in a state where the trays are not on the conveyer.
- (2) Turn the power OFF.
- (3) Adjust the speed.
 1. Fully open the speed controller for the tray returning direction. Set the adjusting knob of the speed controller for the tray feeding direction to approx. 5.0 mm as illustrated at bottom left.
 2. Push the solenoid select valve, and adjust the speed controller to set the same speed for tray feed cylinders CYR and CYL.
 3. Tighten lock nut ⑤ to fix the speed.



Cylinder Moving Time



1 Cycle Time

Cylinder Cycle	6.2 sec
Total Cycle	6.5 sec

[11.2] Checking of Air Piping

Check that the piping is arranged as illustrated.
The hose color varies with the tray moving direction.

Air hose

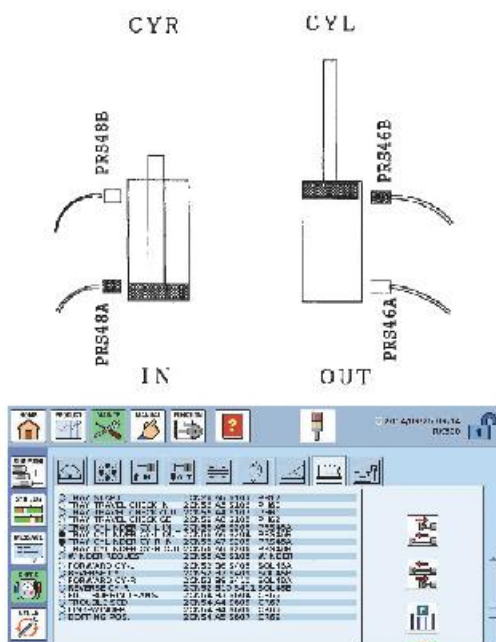
Air hose	Peg tray	
	Clockwise	Counterclockwise
①	Yellow	Blue
②	Blue	Yellow
③	Yellow	Blue
④	Blue	Yellow

[11.3] Checking the Proximity Switch Operations

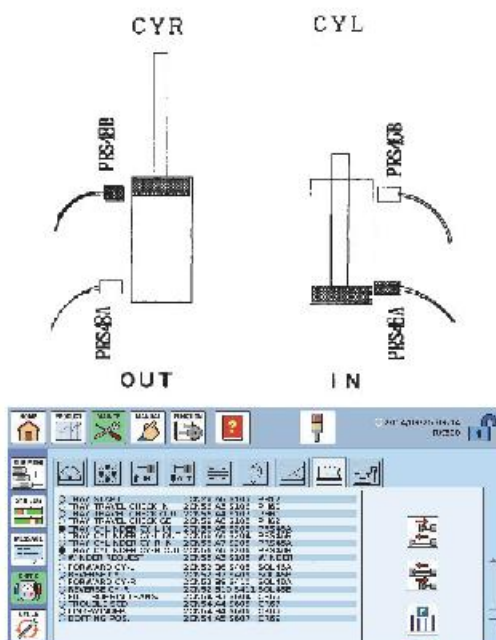
Call up the SCD I/O monitor screen and check the cylinder operations and the input signal status.

For the monitoring procedure, refer to Subsection 6B [4.1] "I/O Monitor Reference Method".

- (1) When the air cylinders are shown at the left, check that bits 5 and 6 of PI28 are ON (●).

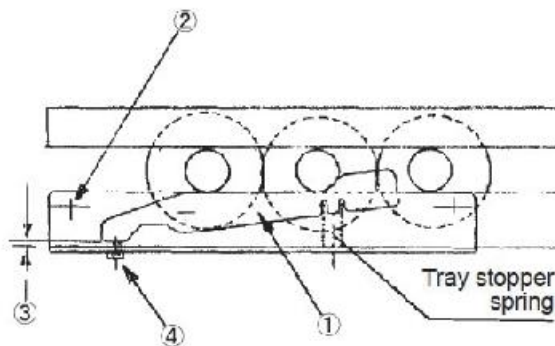
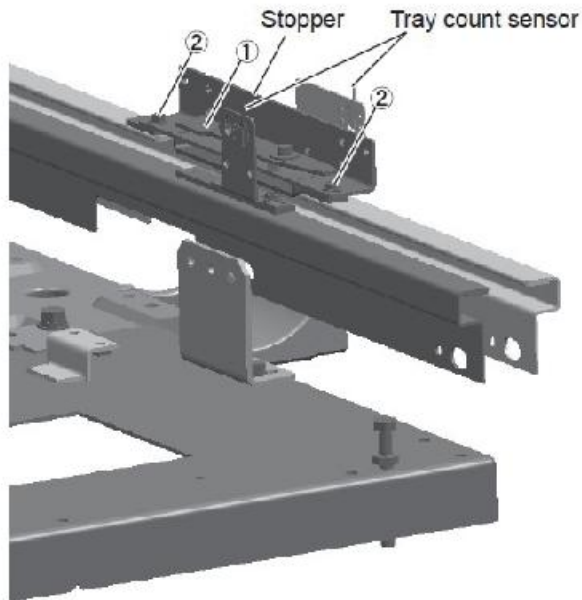


- (2) When the air cylinders are as shown at left, check that bits 4 and 7 of PI28 are ON (●).



[11.4] Adjusting the Tray Stopper (Winder Link Specification Only)

The tray stopper prevents tray positioning failure that could be caused by tray pressure variation. It has the stopper function and the position detection function.



■ Stopper function

Even if the tray pressure varies, the tray stopper spring which presses stopper plate ① absorbs the variation to some extent, preventing tray positioning failure.

(1) Stopper adjusting method

1. Load empty-bobbins on the trays, loosen bolt ②, and move the whole of the tray stopper so that their sensors become aligned with the center of bobbins
2. To determine the front-to-rear position of stopper plate ①, turn bolt ④ so that its length from plate ① comes to 7 mm, and then secure bolt ④ with a nut.
3. After positioning, check that the trays can move with torque of 1 to 2 kg.

(2) Checking the tray stopper operation

1. Operate the tray and check if trays pass the stopper plate without a problem.

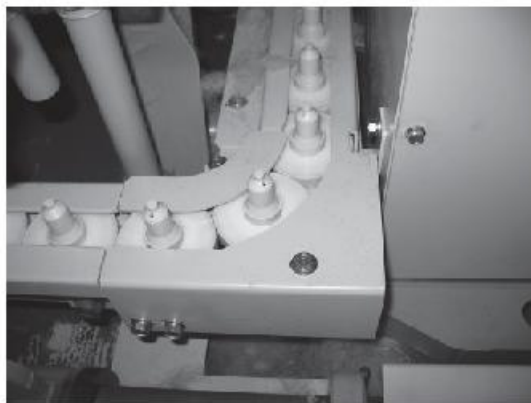
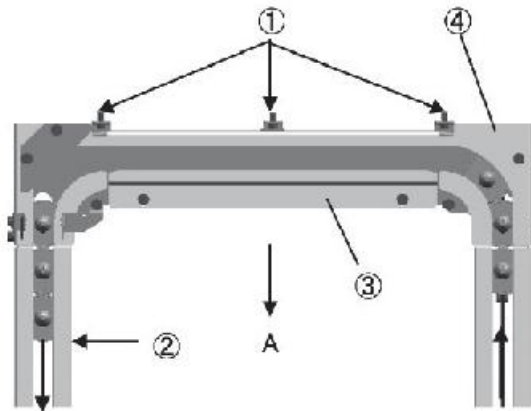
■ Tray feed count sensor

Counts the number of bobbins fed to the spinning frame. Upon arrival of a tray without a bobbin, feeding is stopped.

(1) Adjustment method

Load an empty bobbin on the tray, loosen the bolt and fix the bracket after moving it to the position where the center of the bobbin is aligned with the sensor light axis.

[11.5] Adjusting the GE Turning Section



- (1) Loosen bolts ① and adjust the GE turning section to make the joints at the tray inlet and outlet flat.
- (2) In a test run of the SCD full of trays, move trays in the direction of the arrows shown at left and adjust the GE turning section to eliminate any gap at section ②.
 1. Check the tray cylinder speed again.
ADJUSTMENT CRITERIA:
 The operation stops in about 4 seconds. (Time length required for the cylinder to move from IN to OUT)
 2. If any gap is found at section ②, move the top covers ③ and ④ at the GE turning section in the direction of arrow "A."
- (3) Pass trays through the GE turning section and joint sections and check to see that they travel smoothly.
- (4) The clogging check sensor is installed at the turn outlet. Fix it so that the sensor light axis is aligned with the center of the tray.

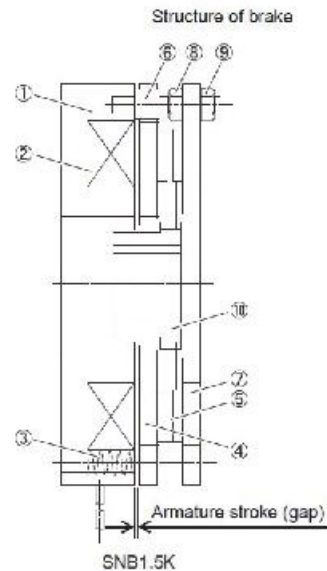
[11.6] Adjusting the Tray Covers

- (1) Check the tray covers for no level difference at their joints.
- (2) Load several trays and check to see that they travel through the whole of the tray rail smoothly.

[12] Brake of Doffing Motor

[12.1] Structure and Mechanism of the Brake

The brake is an electromagnetic brake which is spring-driven and excitation-released. It is designed to be failsafe; the brake is always applied as long as no power is supplied.



No.	Parts Name	No.	Parts Name
①	Field	⑥	stud bolt
②	Exciting coil	⑦	Side plate
③	Coil spring	⑧	hexagon nut
④	Armature	⑨	hexagon nut
⑤	Disc	⑩	Inner driver

(1) Releasing brake

When the brake power is turned on, coil ② is energized to attract armature ④ to the field ① against the compression force of coil spring ③. This releases disc ⑤ from armature ④ to enable the motor shaft to rotate.

(2) Braking

When the motor power is turned off, coil spring ③ pushes armature ④ against disc ⑤ to generate braking torque against the rotation of motor shaft.

[12.2] Armature Stroke for Worn Brake Lining

When the SCD leaves the factory, the armature stroke of the doffing motor brake is adjusted to approx. 0.15 to 0.3 mm. If the brake lining is worn to make the armature stroke exceed 0.7 mm, brake replacement is necessary.

CAUTION

The armature stroke should not exceed 0.7 mm. If it exceeds 0.7 mm, burnt or broken parts could result due to attraction failure. Be sure to perform maintenance gap measurement.

5B. OPERATION

[1] OPERATION

WARNING

During the operation, be sure to observe the following precautions.

(1) Absolute precautions

1. Never start the SCD without communicating your intention to co-workers or without confirming their answer to your signal.
2. Never touch the spindles, ring rails, doffing bars, or trays until the RX and SCD come to a complete stop. In the automatic doffing operation, be careful even if those moving parts seem to have stopped. The RX may stop temporarily and will start operation automatically and suddenly.
3. Never touch the reciprocating sections driven by the air cylinder of the tray transfer device.
4. Never operate the RX or SCD in clothes which could become entangled in the rotating parts.
5. Never remove any of the warning notice, caution plates or instruction plates from the SCD, no matter what.
6. The temporary warning notice (tag) should be removed only by the person who put it up, once it has become unnecessary.
7. If the yellow lamp of the signal indicator comes on, immediately go away from the RX or go out of the intra-frame passages. At the same time, bring out maintenance carts or roving from the intra-frame passages for preventing serious accidents.
8. When the operator has to go away from maintenance carts or roving carts, always bring them out from the intra-frame passages.
9. Never reach out towards the tray conveyer or its surrounding area even if the RX is on halt. If the conveyer has not finished transferring trays, it will suddenly start transferring even if the RX is on halt.

(2) Handling abnormal situations

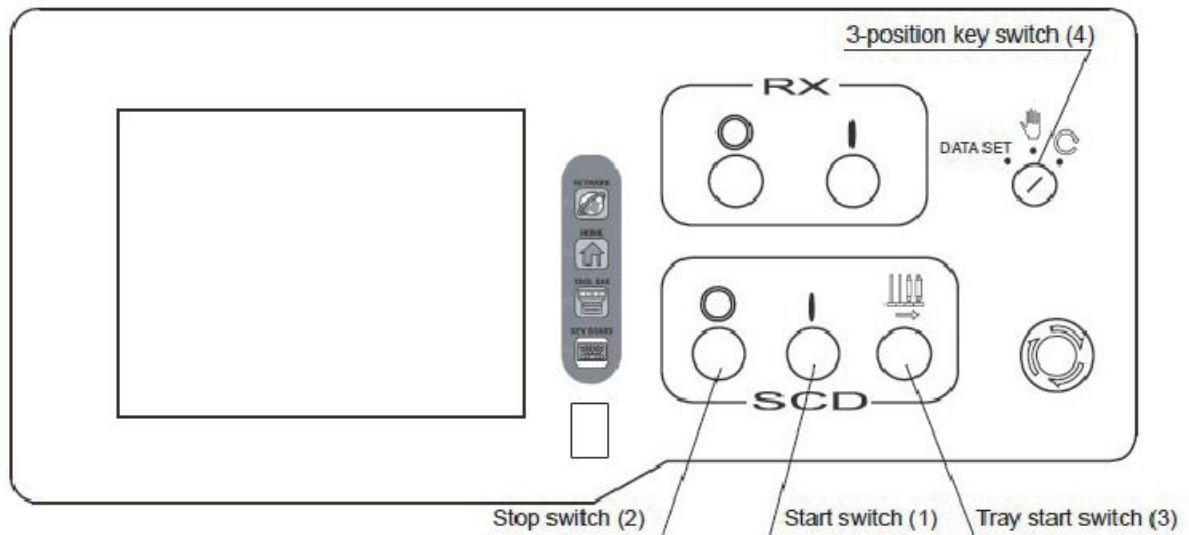
1. Always power off the RX and SCD before making any adjustments or repairs to correct abnormalities occurring during operation.
2. If you turn off the RX or SCD, be sure to put up the warning notice on the power switch.
3. The temporary warning notice (tag) should be removed only by the person who put it up, once it has become unnecessary.

(3) Other precautions

1. The supervisor should make sure that each worker sufficiently observes all safety rules.
2. Observe the safety codes and regulations enforced in individual countries.
3. Observe the RX Instruction Manual Section S.1 "Safe Work."

[2] Description of Control Panel

[2.1] Control Panel Switches and Their Functions



(1) Start switch

Pressing this switch starts the SCD.

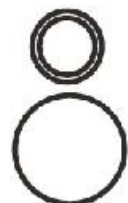
1. If the 3-position key switch (4) is set to the automatic operation position and starting conditions are met, pressing this switch starts doffing.
2. When the SCD is on halt after enforced doffing, pressing this switch starts automatic operation. (It may be impossible to start automatic operation depending upon the conditions.)

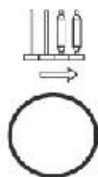
REFERENCE: This switch cannot start the RX.



(2) Stop switch

1. Pressing this switch stops the SCD.
 - Pressing this switch during tray operation stops the SCD in the cycle-stop position.
2. If the doffing bar is in the storage position and the gripper is opened, holding down this switch for 5 seconds or more will display the "SCD Counter Reset!" message and the subsequent automatic operation will start with moving down the doffing bar to the PA position (This is called SCD process reset function).
 - If you have run the SCD by manual





operation, you should activate the SCD process reset function.

(3) Tray start switch

Pressing this switch starts automatic tray operation.

1. No tray ejection operation takes place without receiving request signals from the winder.

(4) 3-position key switch

This switch allows you to switch to the automatic operation, manual operation, or settingenable mode.

1. When set to the automatic operation position
 - The automatic tray operation or automatic doffing is possible.
2. When set to the manual operation position
 - The manual tray operation or manual doffing is possible.
3. When set to the setting-enable position
 - You can modify the stored data. Only when both the RX and SCD are on halt, data modification is allowed.

[2.2] Calling Up the Manual Switch (SCD) Screen

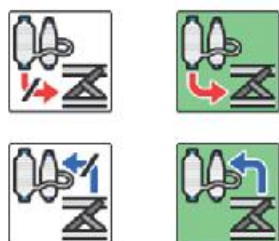
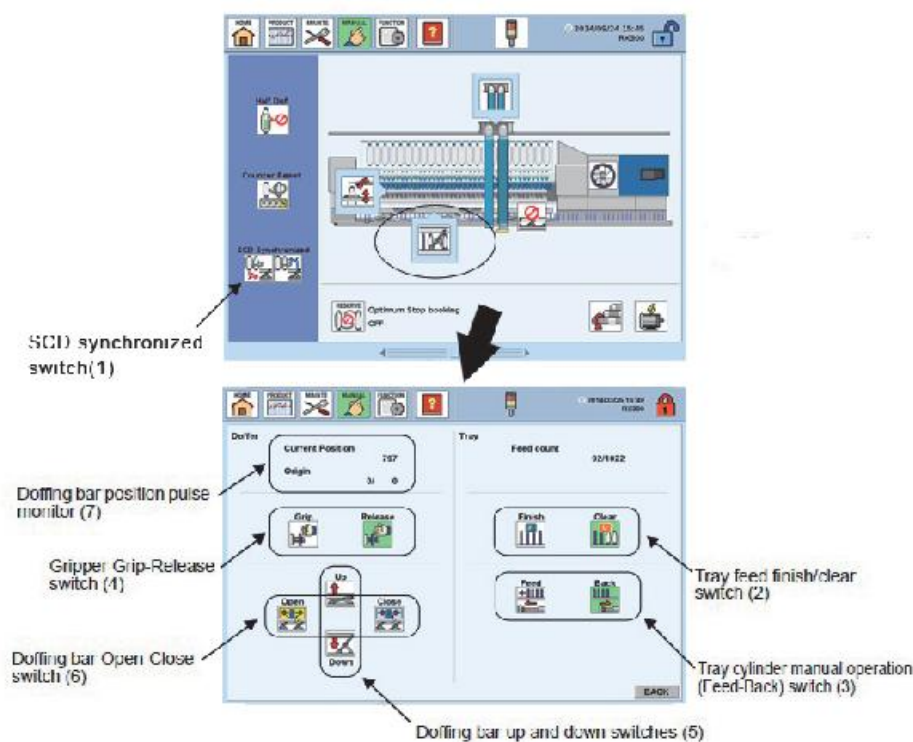


- (1) Touch the [MANUAL] switch.
- (2) Touch the [Doffer-Tray] switch.



The manual operation screen at left appears.

[2.3] Manual Switches and Their Functions



(1) SCD synchronized switch

Press this switch to synchronize the SCD operation with the RX operation.

1. Touch the SCD synchronized switch to select synchronized or non-synchronized operation.

※Set and cancel RX to SCD or SCD to RX synchronization.



(2) Tray feed finish/clear switch

Press this switch to provide or clear the tray feed finish signal.

1. This switch is invalid unless the key switch is set to the manual position.
2. indicates finish, and indicates clear.



(3) Tray cylinder manual switches

Pressing these switches feeds trays forwards or backwards manually.

1. This switch is operational when the 3-position key switch is set to the manual operation position.
2. Before pressing these switches, be sure to check that feeding trays will not result in a problem.

NOTE: If you attempt to feed trays with these switches when there is no space at the tray loading side, a tray jam will result.

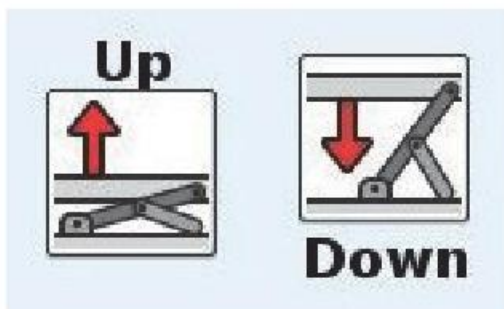


(4) Gripper open and close switches

Pressing the gripper open switch releases bobbins manually; pressing the gripper close switch grips bobbins manually.

When the doffing bar is placed in the preset position, press these switches. If pressed when the doffing bar is out of the preset position, these switches produce nothing.

REQUIREMENTS: The 3-position key switch should be set to the manual operation position.



(5) Doffing bar up and down switches

Pressing the doffing bar up or down switch moves the doffing bar up or down manually, respectively.

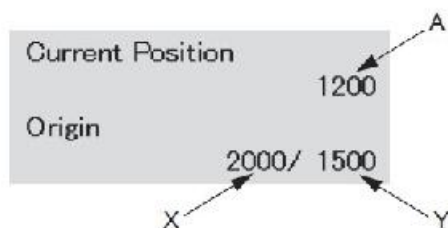
If each of these switches is pressed, the doffing bar moves up or down to the preset position and stops automatically.

REQUIREMENTS: Same as for step (4).



- (6) Doffing bar open and close switches
Pressing the doffing bar open switch opens the doffing bar up to the specified angle; pressing the doffing bar close switch returns the doffing bar to the previous angle. When the doffing bar is placed in the preset position, press these switches. If pressed when the doffing bar is out of the preset position, these switches produce nothing.

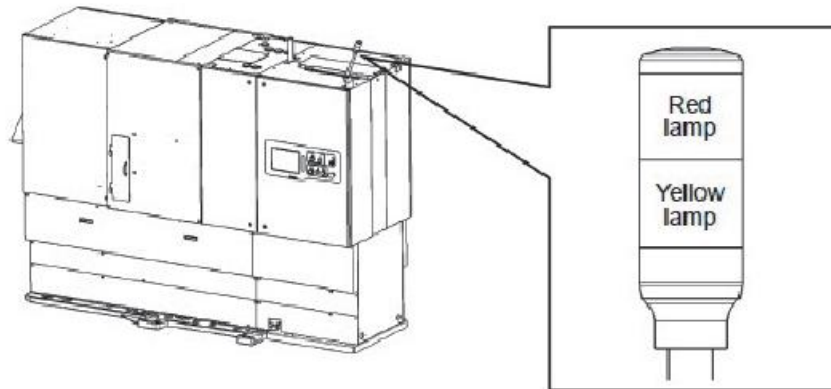
REQUIREMENTS: Same as for step (4).



- (7) Doffing bar position pulse monitor
A: Current encoder pulse count
X: Reference encoder pulse count when the PRS22 was turned on in previous doffing.
Y: Reference encoder pulse count (Initial value: 99999)

[3] Signal Indicator

On the top of the OE, GE of the RX is a two-lamp signal indicator which informs the operator of the RX and SCD status.



[3.1] Indicator Color and RX and SCD Status

See Subsection 5.1.2 and 5.1A.2 in Chapter 5 of the RX Instruction Manual.

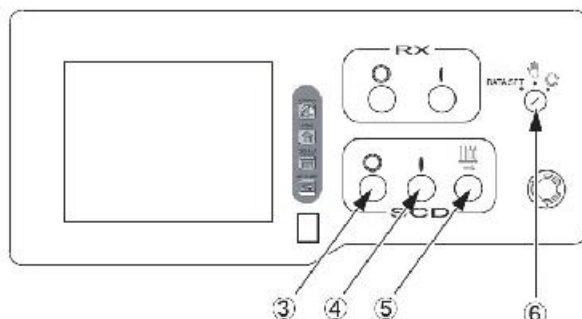
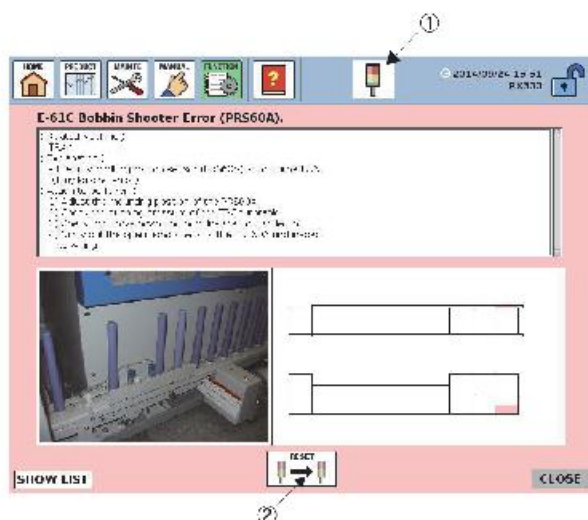
[3.2] Basic Operation when the Yellow Lamp is Lit

See Subsection 5.1.2 [2.1] and 5.1A.2 [2.1] in Chapter 5 of the RX Instruction Manual.

[3.3] Basic Operation when the Red Lamp is Lit

⚠ WARNING

Put up the warning notice saying "DON'T TURN THE SWITCH ON" in order to prevent persons other than the worker in charge from turning on the switches.



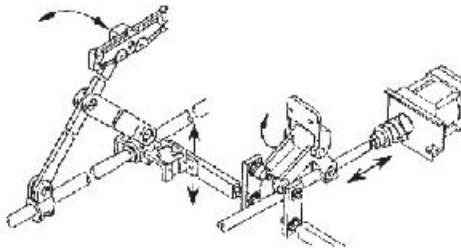
- (1) If the red lamp of the signal indicator comes on, immediately go to the SCD whose lamp is lit.
- (2) If a trouble occurs with SCD, the SCD and trays stop.
- (3) Press the SCD stop switch (3).
- (4) The operator should touch icon (1) on the operation panel to check the error message.
- (5) For the description of the error message and remedy, see RX Instruction Manual Section 9.1A "Troubleshooting".
- (6) Correct the trouble in accordance with the method of troubleshooting.
- (7) Perform reset operation.
Press the Alarm Reset (2) on the screen.
- (8) The operating method after stopping SCD
 1. During doffing
 - a. Set the 3-position key switch (6) to AUTO.
 - b. Press the SCD start switch (4).

If it is impossible to continue operation, set the 3-position key switch (6) to MANUAL and finish doffing manually.
 2. During operation of the trays
 - a. Set the 3-position key switch (6) to AUTO.
 - b. Press the switch (5) to start the trays.

[4] Configuration of SCD

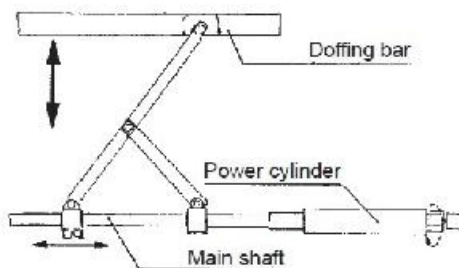
The SCD consists of the following three major units.

- Doffing bar open/close unit
- Doffing bar up/down unit
- Gripper open/close unit



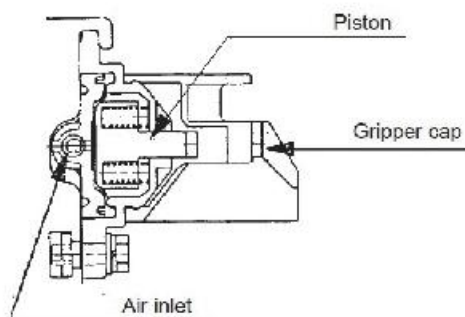
(1) Outline of doffing bar open/close unit

1. The open/close operation of the doffing bar is performed by means of the air cylinder.
2. The "OUT" / "IN" of the air cylinder makes the lever swing and the doffing bar open/close.
3. The air cylinder is equipped with the lead switch that identifies each position of open/intermediate/close.



(2) Outline of doffing bar up/down unit

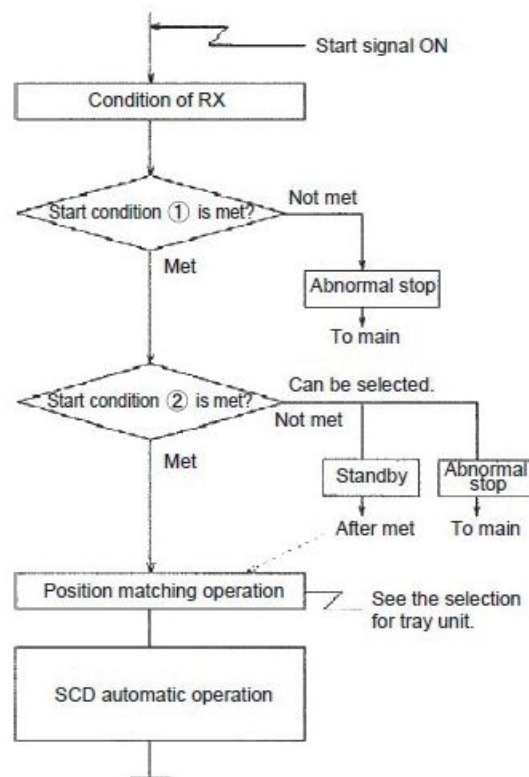
1. The doffing motor makes the power cylinder turn to move the main shaft.
 - a. The doffing motor adopts inverter control.
 - b. The motor is driven forward and backward.
 - c. When the motor is turned OFF, the brake operates at the same time.
2. As the main shaft moves, the doffing bar goes up and down.
3. Each stop position is controlled by the CPU that processes the signal of the encoder attached to the gear box.



(3) Outline of the gripper open/close unit

1. The gripper uses air pressure for open/close operation.
2. The open/close is performed as the air is fed (the bobbin is gripped) or the air is not fed (the bobbin is released).
3. The gripper cap is designed to work out if it undergoes excessive torque.

[5] Outline of SCD Automatic Operation



(1) What is Start Signal ON?

1. It is a start signal from the RX.

It is output:

- a. By the full bobbin production length
- b. By operating the doffing switch during operation

2. It is a signal output by pressing the pushbutton switch for starting the SCD.

(2) The RX conditions required for SCD operation

1. The ring rail position is within the range of 0 to 10 mm.
2. The lappet reverse check sensor is ON.

(3) What is Start Condition ①?

1. The doffing bar is in the storage position.
2. The gripper is open.
3. The stop switch is not pressed.
4. The proximity switch for over rising/lowering is ON.
5. The thermal switch is not operating.

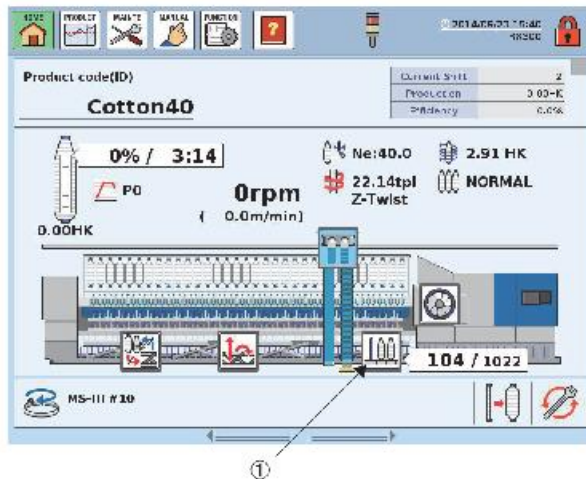
(4) What is Start Condition ②?

1. The tray is not being extracted. (The specified number has been extracted.)
2. The blow cleaner is in standby, position.
3. The adjacent SCD is not doffing. (Option)
4. There is a full bobbin request signal.

REFERENCE: For items 1) to 4), it is necessary to select and wait until the condition is met so that automatic start can be performed.

[6] Start/Stop Operation of the SCD

[6.1] When Starting the SCD



(1) The following conditions are required for starting the SCD:

1. Full bobbins have been carried out fully.
The tray icon ① has turned blue. (Full bobbins on the tray have been replaced with empty bobbins.)
2. The RX is stopping in the full bobbin state.
3. The blow cleaner stops in standby position as specified.
4. The SCD receives a full-bobbin request signal.

REFERENCE: In the case of the group connection (connection of RXs and winder), the request signal is not required).

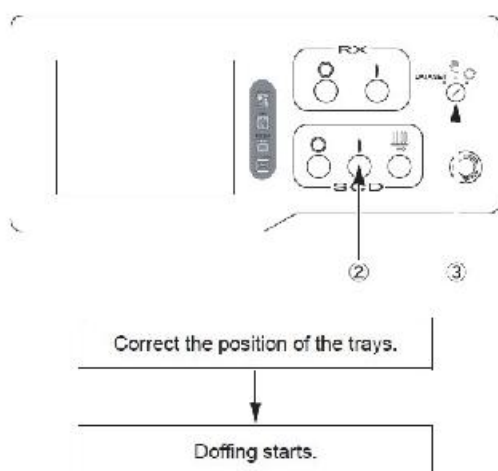
5. *The adjacent SCD is not doffing.
 - (The adjacent RX is interlocked.)
 - Items marked with an asterisk are the requirements for those RXs equipped with options.
 - For the details of the necessary condition, see Section 5B [7].

⚠ WARNING

Before starting the SCD, be sure to check that there are no operators or maintenance workers near the RX and SCD.

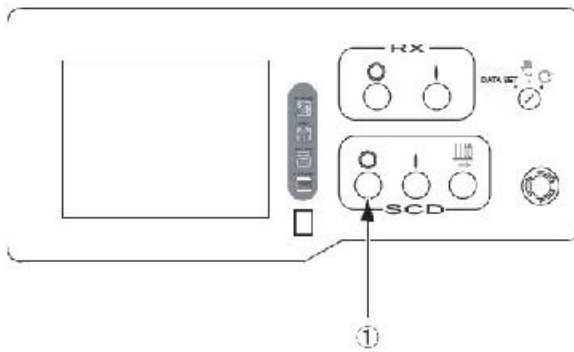
Always communicate your intention to coworkers if any.

5B. OPERATION



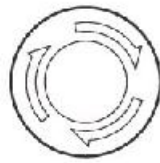
- (2) If the above starting conditions are met, set the 3-position key switch ③ to the automatic operation position and then press the SCD Start switch ②. The SCD corrects the tray position, then starts doffing.

[6.2] Stopping the SCD and Tray Operation



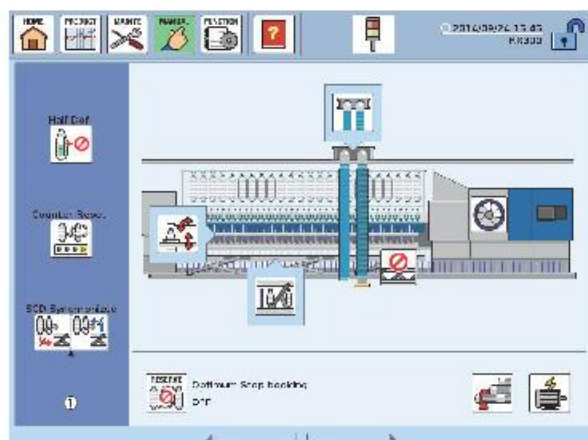
- (1) Press the Stop switch ①.
 1. The SCD stops immediately.
 2. Even if the Stop switch is pressed during open/close operation of the doffing bar, the SCD does not stop immediately. It continues to operate until open/close operation is completed.
 3. In an emergency, press the emergency stop button.
 4. To stop the SCD during tray operation, press the Stop switch ①.

NOTE: The RX Stop switch cannot stop the SCD.



Emergency Stop button

[6.3] For Doffing Operation Interlocked with RX (Full Automatic Operation)



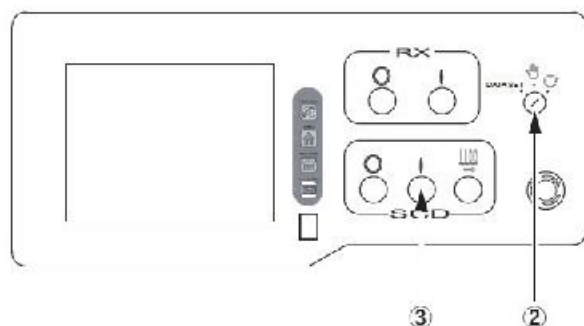
- (1) On the manual switch screen (SCD), touch the SCD synchronized switch ①.

 RX to SCD synchronized operation

 RX to SCD non-synchronized operation

 SCD to RX synchronized operation

 SCD to RX non-synchronized operation



- (2) The necessary conditions for SCD operation must be met before the RX reaches the full bobbin state.

1) The conditions given in Subsection 5B [6.1](1) should be met.

- (3) Set the 3-position key switch ② to the AUTO.

REFERENCE: When the necessary condition for SCD operation is not met and the RX has the full bobbin.
When the SCD start switch ③ is pressed after the condition is met, doffing starts.

[6.4] Doffing Not Synchronized with RX (Independent Doffing)

- (1) On the Manual Switch (SCD) screen, touch the switch ① and confirm that the icon becomes white.
- (2) The necessary conditions for SCD operation
 - 1) The RX should have come to a full-bobbin stop.
 - 2) The conditions given in Subsection 5B [6.1](1) should be met.

WARNING

Before starting the SCD, be sure to check that there are no operators or maintenance workers near the RX and SCD.
Always communicate your intention to coworkers if any.

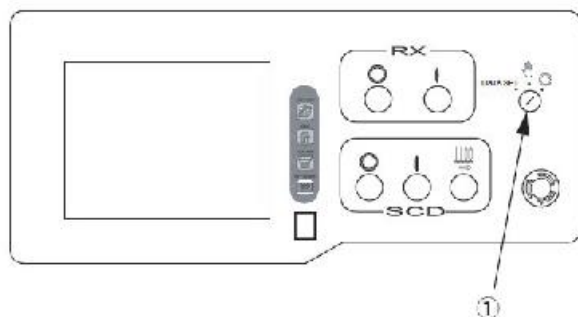
- (3) When an independent operation is selected, an operator should press the SCD start switch ③ to start doffing.
During an independent operation, an operator should restart the RX after doffing is completed.

[6.5] When Doffing by Operating the Manual Switch

⚠ CAUTION

Before starting the SCD, be sure to check that there are no operators or maintenance workers near the RX and SCD.

Always communicate your intention to coworkers if any.

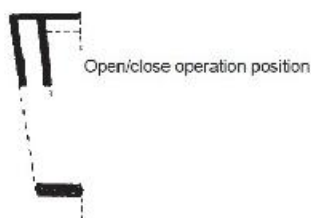
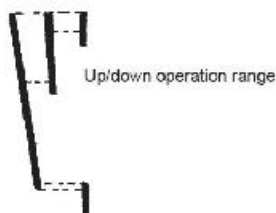


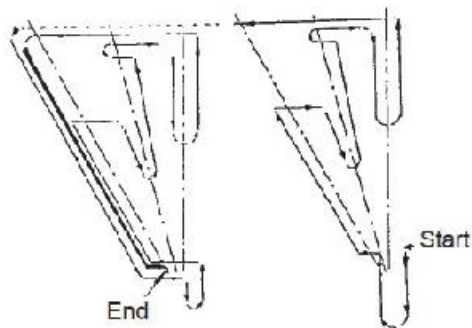
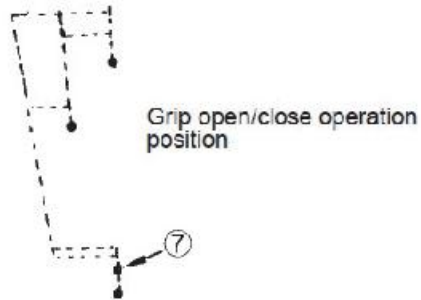
- (1) Turn the 3-position key switch ① to the manual position.
- (2) Checking the necessary condition for SCD operation
 1. The RX should have come to a full-bobbin stop.
 2. The conditions given in Subsection 5B [6.1](1) should be met.
- (3) Perform peg position matching before starting manual doffing.

REFERENCE: This operation is impossible if the specified number of trays have not been carried out.



- (4) Up/down operation of the doffing bar
 1. Press ②.
 - a. Press to make the doffing bar go up.
 - b. Press to make the doffing bar go down.
 2. Operation is possible in the range of the thick lines.
- (5) Open/close operation of the doffing bar
 1. Press ③.
 - a. Press to open the doffing bar.
 - b. Press to close the doffing bar.
 2. Operation is possible in the position of the thick lines.





(6) Open/close operation of the gripper

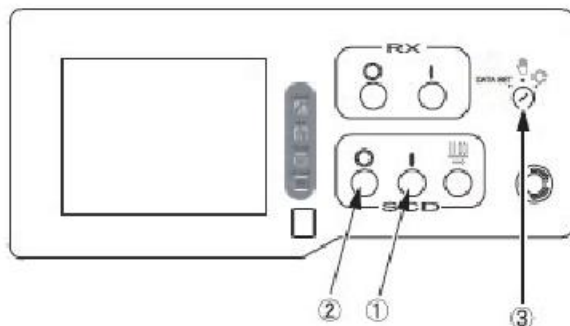
1. Press ④.
 - a. Press  to grip.
 - b. Press  to release.
2. Open/close operation is possible in the position of black dots.
3. Release operation is only possible in the position ⑦.

(7) The figure to the left shows the sequence of doffing operation.

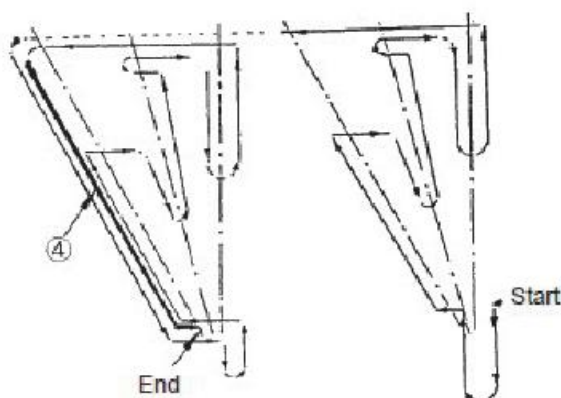
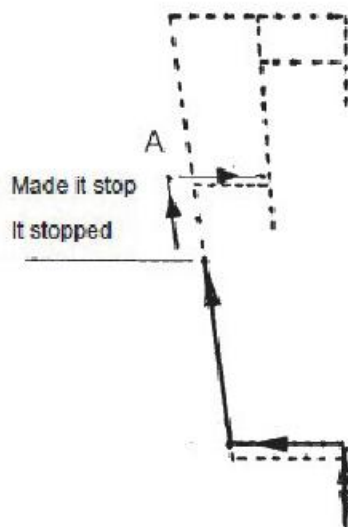
The operation lasts from the to the end.

[6.6] When Continuing Automatic Operation After Stopping the SCD

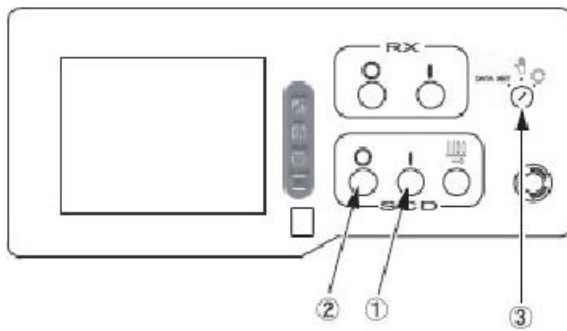
(1) The continuous operation is allowed when:



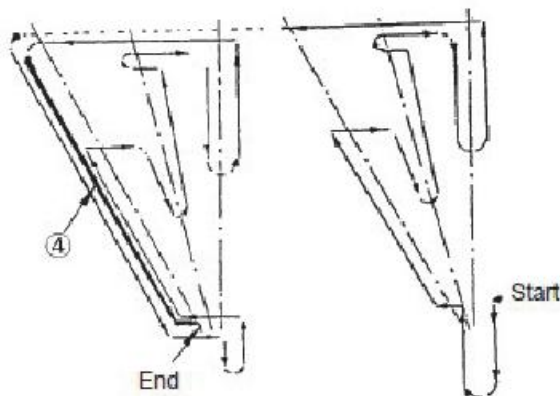
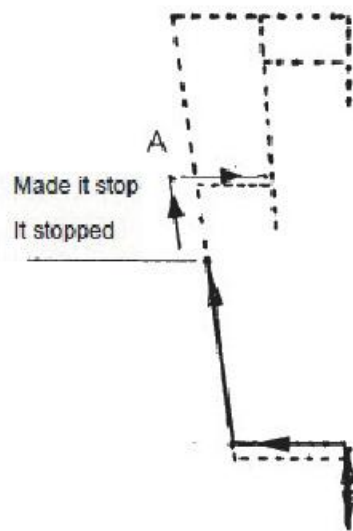
- (1) After stopping using the stop button , press the start button to continue operation. (When the SCD is not driven manually.)
- (2) When continuous operation is possible by manual operation after the stop
 1. When proceeding to the following process manually after stopping, perform the following operation at the destination of the following process (direction of A).
 2. Turn the 3-position key switch ③ to the automatic position.
 3. Press the start switch ① to continue operation.



(2) The continuous operation is impossible when:



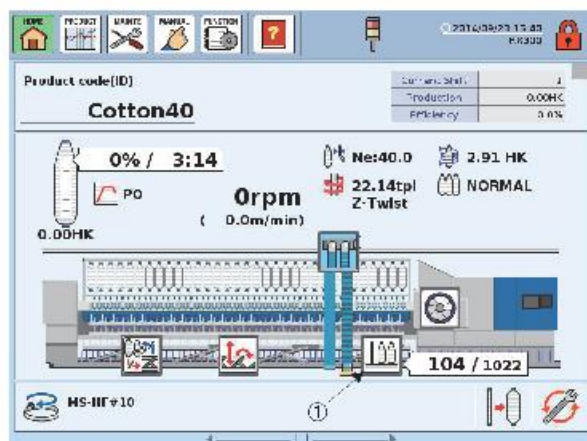
- (1) The SCD is manually operated so that it goes out of the automatic operation route.
- (2) When the SCD stops in the range of thick line ④ after restarting RX.
- (3) When the continuous operation is impossible, set the key switch ③ to AUTO and press the start switch ① to display the error message "M-59" (continuous operation is impossible).
 1. Set the key switch ③ to MANUAL.
 2. Perform manual operation up to the final process.



REFERENCE: After performing manual operation of the SCD, reset the RX production length counter and press the RX start button to operate the RX.

[7] Requirements for SCD Operation

[7.1] Specified Number of Trays Carry-out Completion Signal



The tray icon ① turns blue upon carrying out the specified number of trays.

Specified number of trays: Number of spindles per RX + CFC

※960-spindle (2-head specification) type

- The finish signal is issued when 974 pegs (960 spindles + Set CFC value (standard: 14)) are carried out.

※1824-spindle (3-head specification) type

- The finish signal is issued when 1856 pegs (1824 spindles + Set CFC (standard: 32)) are carried out.

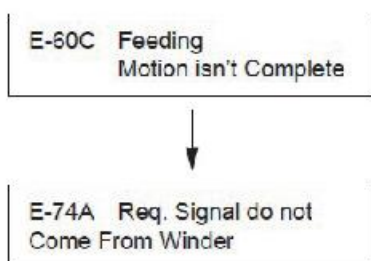
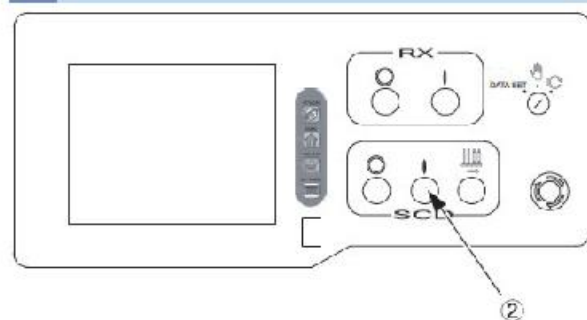
※The CFC value can be set after touching [FUNCTION] – [SCD].



- (1) The [TRAY] icon ① on the home screen turns blue.

If it does not turn blue, operate the winder to carry remaining trays out.

- (2) If the start conditions are not satisfied when the start switch ② is pressed, error message "E-60C" appears. For details of the error message, see RX240 Instruction Manual Section 9.1, 9.1A "Troubleshooting".



[7.2] Full Bobbin Request Signal

- (1) The winder issues this signal to request a full bobbin for the RX.
- (2) If this signal is not issued, the position fixing operation cannot start, disabling doffing.

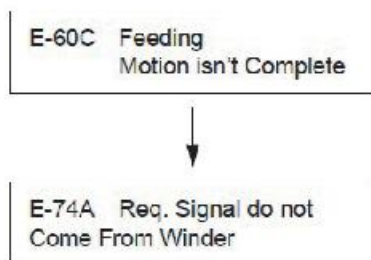
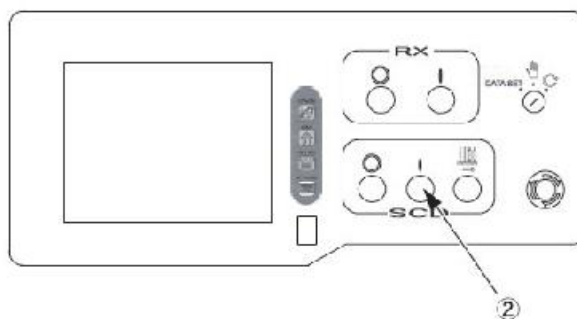
(The Request signal is required only for oneto- one connection.)

REFERENCE: When the Request signal is not issued, the winder may be faulty.

- (3) If the start condition is not satisfied when the Start switch ② is pressed, the error message “E-74A” appears in the window ③.

[7.3] Blow Cleaner Shunt Signal (Option)

This signal is used to prevent the blow cleaner from touching the SCD.

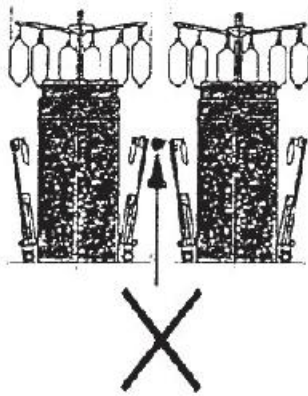


- (1) Check whether the blow cleaner has shunted at the specified position.
- (2) If a Shunt signal has not been issued, check whether the blow cleaner mode is still in the MANUAL mode.
(Move the blow cleaner to the specified position manually and stop it.)
- (3) If the start condition is not satisfied when the START switch is pressed, the error message “E-58C” appears.

[7.4] Adjacent SCD Interlock (Option)

The adjacent SCD interlock prevents adjacent SCDs from doffing at the same time.

(This interlock is required when there is only a narrow space between SCDs.)



E-58E DOFFER
Interlocked Side Frame

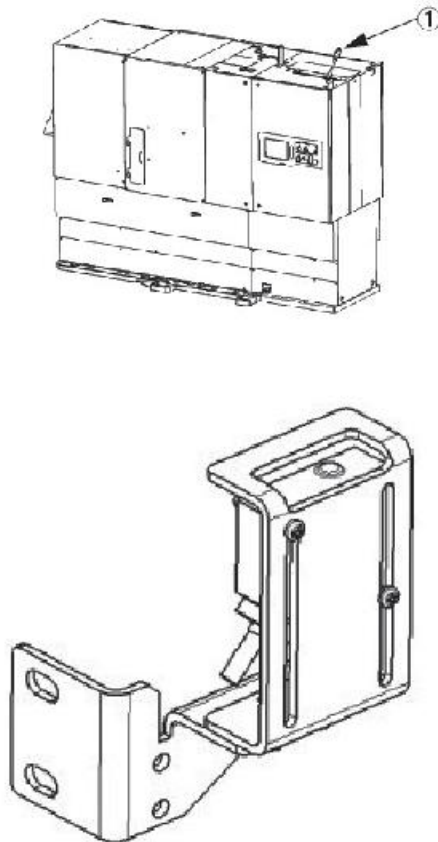
- (1) While either SCD is doffing, the adjacent SCD is prevented from starting.
- (2) If the start condition is not satisfied when the START switch is pressed, the error message "E-58E" appears.

[8] Remedy for Undoffed Full-bobbins (Error Message "E-56R, L")

⚠ CAUTION

Before starting the SCD, be sure to check that there are no operators or maintenance workers near the RX and SCD.

Always communicate your intention to coworkers if any.



If an undoffed full-bobbins error (E-56) occurs, the SCD makes the gripper grip empty-bobbins at the intermediate pegs in the 2nd cycle of automatic operation, turns on the red lamp of signal indicator ①, and then stops itself.

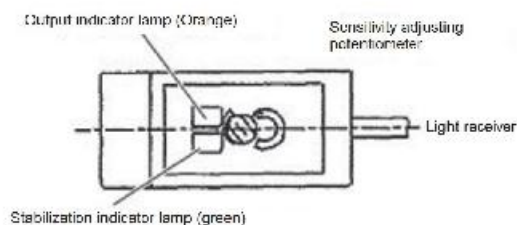
NOTE: If the Doffer Check Stop feature is set to ON on the Doffer Spec. screen, the SCD will turn on the red lamp and stop itself after doffing full-bobbins and opening the gripper at the PJ position.

(Refer to Subsection 6B [2.5].)

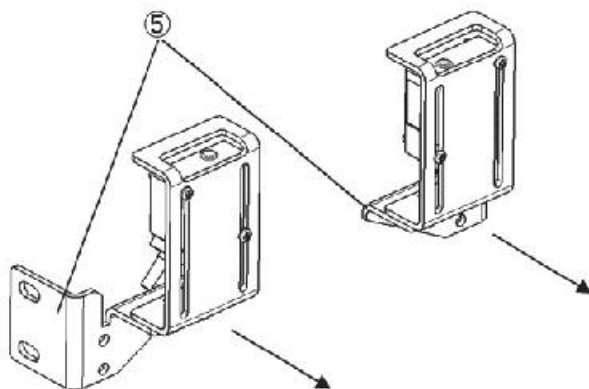
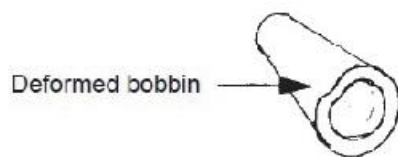
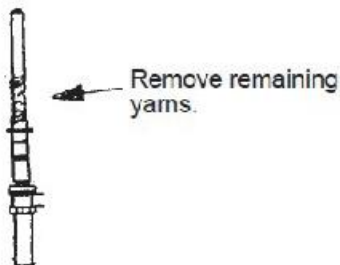
At the same time, the error message "E-56R,L Some Bobbins are on Spindles (PH70RR, L)" appears.

If the red lamp of signal indicator ① comes on after the gripper grips empty-bobbins on the intermediate pegs, it means that an undoffed full-bobbin error has occurred.

At the same time, the error message "E-56R, L Some Bobbins are on Spindles (PH70RR, L)" appears.



- (1) Check the RH side for E-56R and the LH side for E-56L, and manually remove the remaining full bobbin.
- (2) Determine the cause and take an appropriate action.



POSSIBLE CAUSES:

1. Remaining yarns twine around the spindle.
Remove them.

2. The bottom of the bobbin is deformed.
Discard the bobbin.

3. The inside of the bobbin is scratched.
Repair or discard the bobbin.

4. The gripper cannot grip the bobbin
securely.

(Air leakage)

Check air for leakage and pressure, then
remedy the cause.

5. When spinning low-count yarn, the
controller may mistakenly interpret yarn
detected as bobbins undoffed. Move
brackets ⑤ in the direction of arrows by
approx. 3 mm.

- (3) Touch the Alarm Reset key on the operation
panel to clear the error message "E-56R, L".

- (4) Press the SCD Start switch to restart doffing.

[9] Tray Feed System

[9.1] Tray Feed Methods

There are two different tray feed methods.

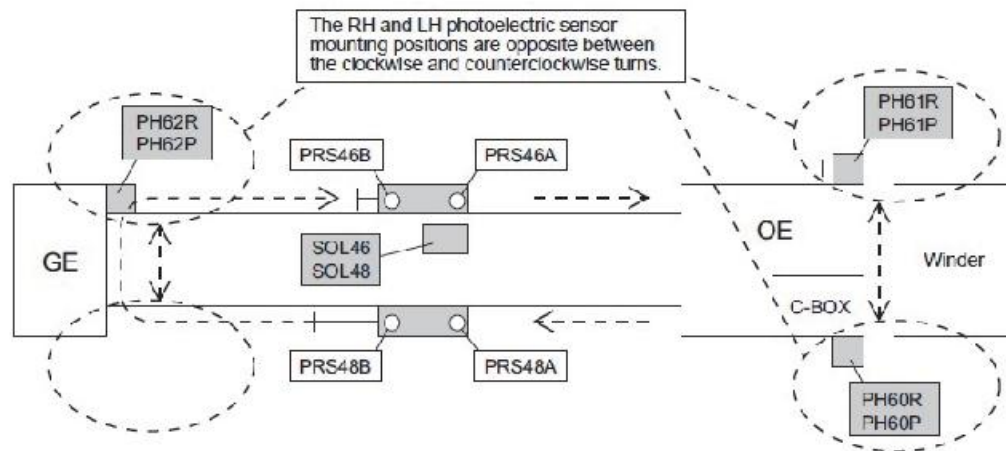
- (1) The first method is to feed a tray clockwise toward the R-winder.
- (2) The second method is to feed a tray counterclockwise toward the L-winder.

[9.2] Operating the Trays

- (1) Check the air cylinder state.

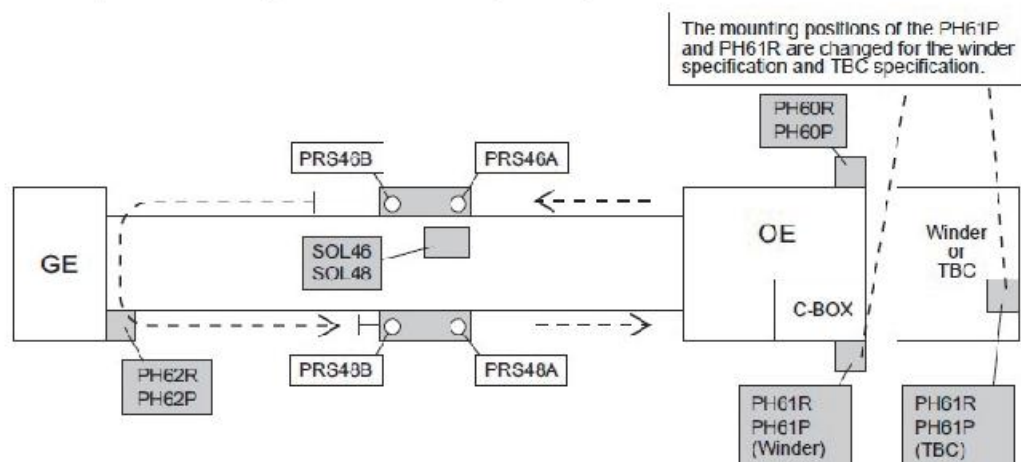
1. In case of tray clockwise turn

The trays cannot be operated if the air cylinder position is not as shown below. (Cycle stop position)

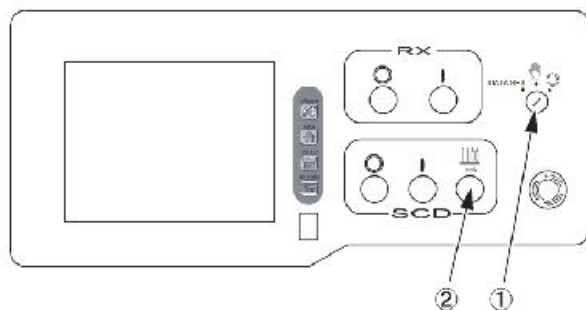


2. Tray counterclockwise turn

The trays cannot be operated if the air cylinder position is not as shown below.

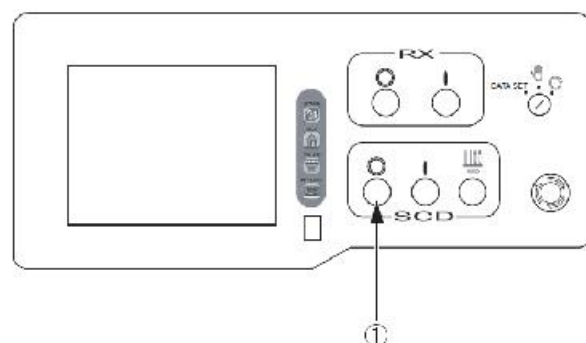


* Each air cylinder is at the home position.



- (2) Turn the 3-position key switch ① to the automatic position.
- (3) Press the Start switch ②.
 - 1) If a Full Bobbin Request signal is received from the winder during automatic operation, then pegs will be carried out.
 - 2) After the specified number of bobbins is carried out, the trays stop automatically to wait for doffing.
 (On the home screen, the tray icon turns blue.)

[9.3] Stopping the Trays



- (1) Press the Stop switch ①.
The trays stop at the cycle stop position.



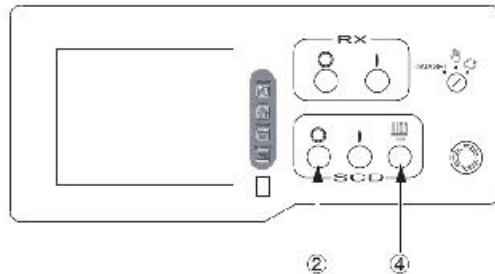
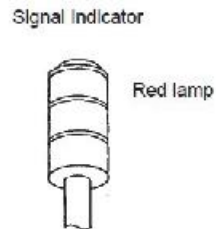
② Emergency Stop button

- (2) To stop the trays in an emergency, press Emergency Stop button ②.
REFERENCE: The RX and all SCDs stop.

[9.4] Remedies for Tray-related Problems

⚠ CAUTION

Put up the warning notice saying “DON'T TURN THE SWITCH ON” in order to prevent persons other than the worker in charge from turning on the switches.



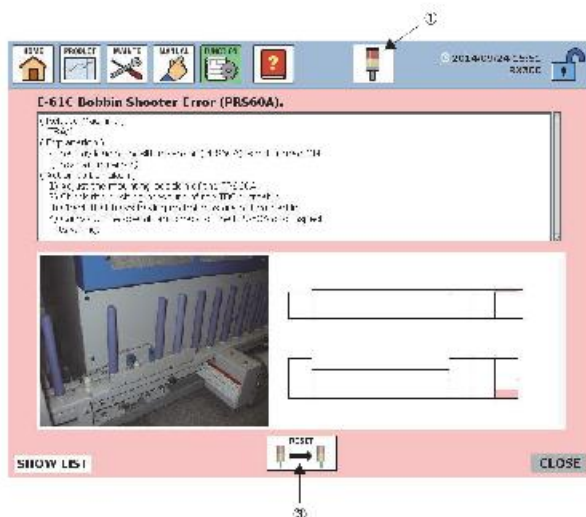
- (1) When you find the red lamp ON, go there immediately.
- (2) When the trouble is related to the trays, stop it.

- (3) Press the SCD Stop switch ②.

1. If a tray-related error occurs, the air cylinder automatically returns.

REFERENCE: Stop after moving to the returning position when tray clogging error message E-62A, E-62B, E-62C, or E-62D is displayed.

2. At this position, correct the trouble.



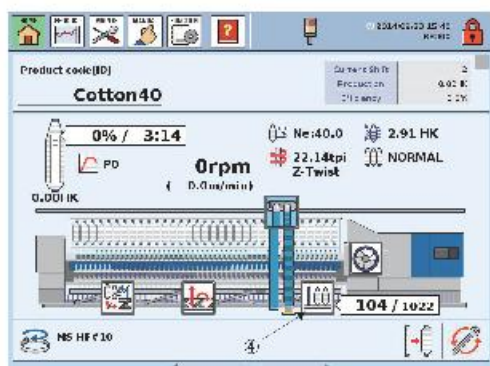
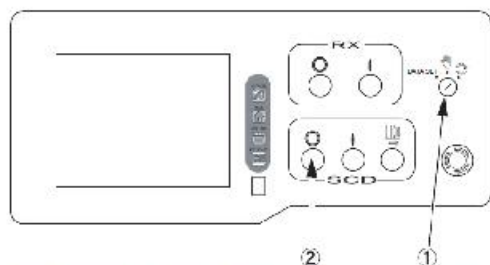
- (4) Touch icon ① on the operation panel to check the contents of the error message.
- (5) For the contents of the error message and remedial action, see RX Instruction Manual Section 9.1, 9.1A “Troubleshooting”.
- (6) Correct the trouble by taking the specified remedial action.
- (7) Press the Alarm Reset key ③ to clear the error message.
- (8) Start operating trays again.
 - 1) Press Start switch ④.

[9.5] Setting (0 ⇒ F) or Clearing (F ⇒ 0) the Tray Carry-out Finish Signal

⚠ CAUTION

During replacement of full bobbins with empty bobbins, never press the SCD or tray start switch.

(1) Setting the tray carry-out finish signal (0 ⇒ F)



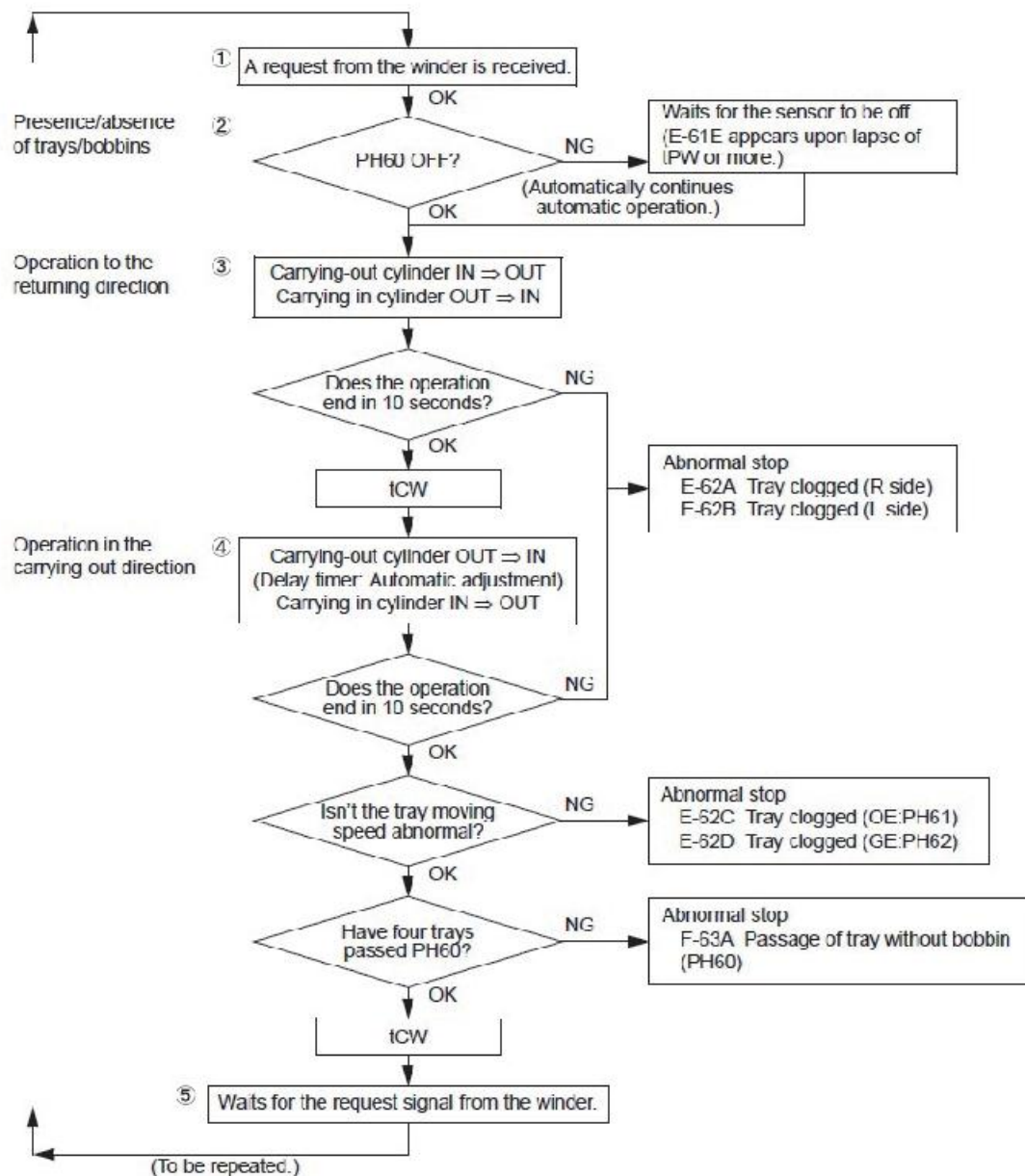
1. Press the SCD stop switch ② to stop the tray operation.
2. Set the 3-position key switch ① to the manual position.
3. On the manual switch screen, touch [Finish] ③.
Check that the frame of ③ turns .
4. On the home screen, check that ④ turns blue.
5. Set the 3-position key switch ① to the automatic position.
6. Replace undoffed full bobbins with empty bobbins by hand to finish carrying-out.

(2) Clearing the tray carry-out finishsignal (F⇒ 0)

1. Perform steps (1) through (2) in the paragraph above.
2. On the manual switch screen, touch [Clear] ⑤.
The frame of ⑤ turns .
3. Set the 3-position key switch ① to the automatic position.
4. Operate the trays for carrying out.
 - a. After clearing, carry out the specified number of trays again.
 - b. Feeding only empty bobbins only to the winder may result in a trouble.

[10] Tray Cycle Operation (For winder, counterclockwise rotation)

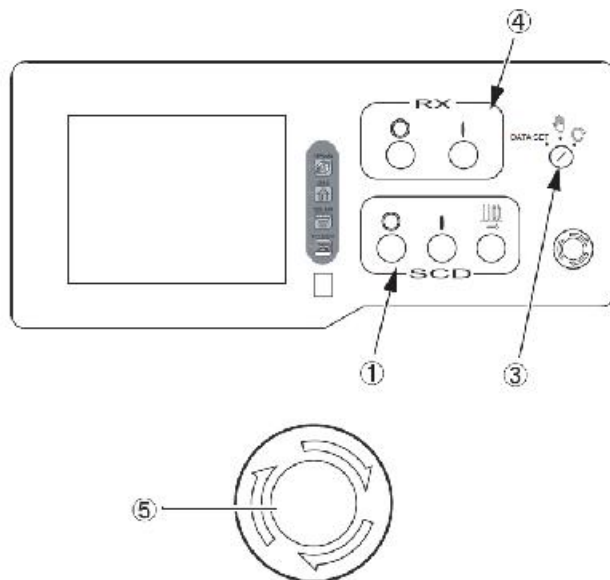
- ① The SCD receives a full-bobbin request signal from the winder.
The SCD checks whether there are trays. If there are any trays, the SCD starts tray cycle operation; if there are no trays, it stops.
- ② Check that there are trays. (Make sure that four trays have passed.)
- ③ The air cylinders move in the tray returning direction.
- ④ The air cylinders (both at the loading and unloading sides) move in the tray carrying-out direction.
- ⑤ The SCD waits for a full-bobbin request signal.



6B. OPERATION PANEL

[1] Overview

You can operate, adjust, and set the SCD from the operation panel located at the OE of the RX.

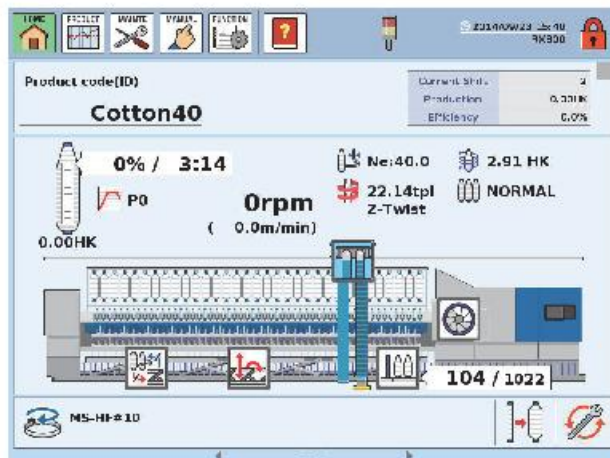


- (1) The exclusive SCD control switches are located in area ① of the control panel as shown at left.

For the details about the switches and LEDs, refer to Section 5B. "OPERATION".

- (2) Switches common to the SCD and RX
 1. The emergency stop button ⑤ should be used in an emergency to stop all of the operations in the SCD and RX.
 2. The 3-position key switch ③ should be used when you set data for the SCD or RX.
 3. Switches on the Function Panel Screen ② are used to set or monitor data.

REFERENCE: Switches ④ are exclusively used for the RX.



[2] Setting the Data

[2.1] Checking before Starting Data Setting

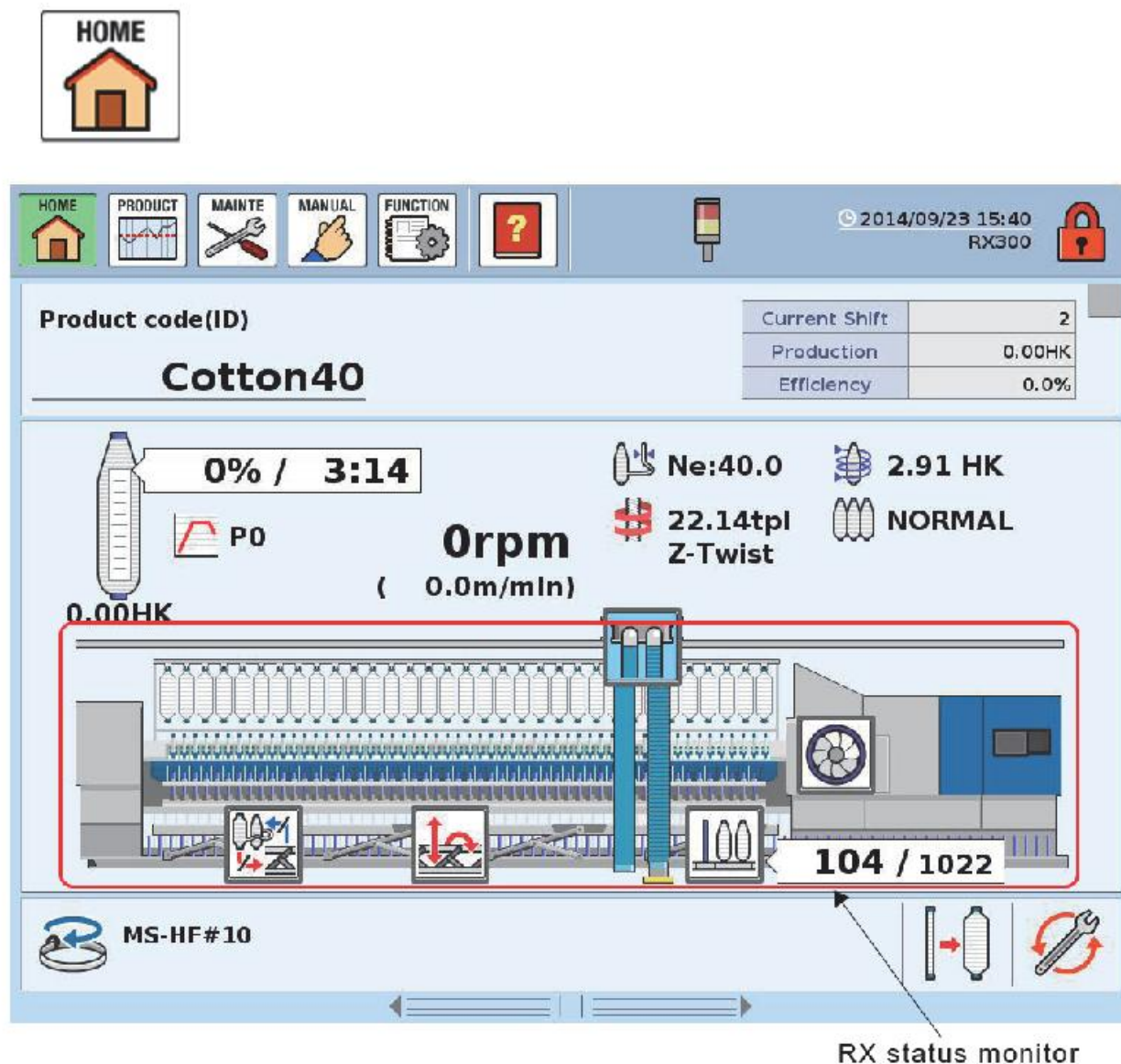
For the basic operating procedure, refer to the RX Instruction Manual, Section 7.1, 7.1A.

Since data setting or modification is not allowed when the RX or SCD is in operation, confirm that the following are on halt:

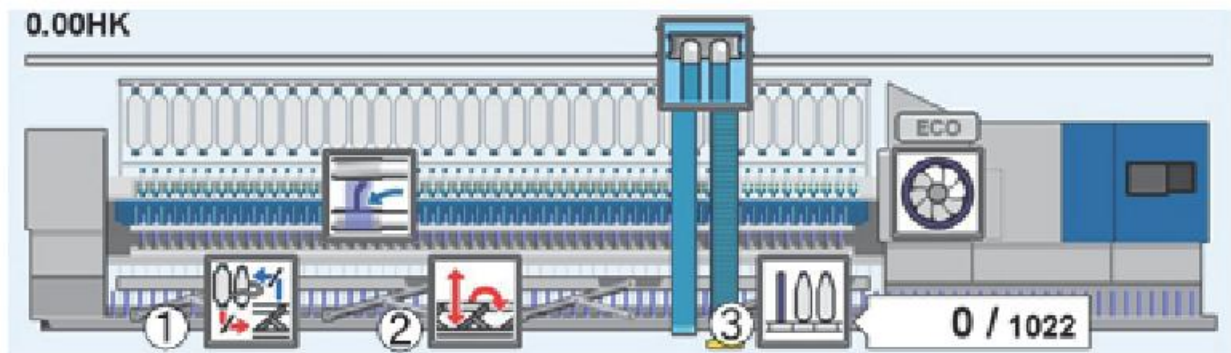
- (1) RX
- (2) Pneumatic device
- (3) SCD
- (4) Trays

[2.2] Contents of Home Screen

Touch the [HOME] icon on the top menu to display the home screen. The RX monitor graphically displays the RX status on the home screen. Especially, the information on SCD is displayed as shown below. (Refer to Subsection 6B [2.3].)



[2.3] RX Status Monitor



Visually displays the current machine operation status by color.

Basically each color indicates the following:

- No color (white) : Ordinary stop
- Green : Running
- Red (blinking) : Abnormal stop
- Blue : Completion
- Yellow/green blinking : Conditional waiting

- ① SCD synchronize/non-synchronize
(only when the SCD is provided)



No color : Non-synchronize setting



Green : All-synchronize setting

※Use the manual operation screen for selection between synchronization and non-synchronization.

- ② Doffer status
(only when the SCD is provided)



White : Ordinary stop

Green : Running

Yellow/green blinking : Conditional waiting (tray conveyance/retract for blow, etc.)

Yellow : Stop for check

Red : Abnormal stop

- ③ Tray conveyance status
(only when the SCD is provided)



White : Ordinary stop

Green : Running

Yellow/green blinking : Conditional waiting (winder request, etc.)

Yellow : Separated stop (TBC Specification)

Blue : Conveyance completion

Red : Abnormal stop

※The figures on the right side indicate the current number of conveyed trays/specified number of trays.

[2.4] Initial Adjustment-setting Screen

On the RX, the SCD cannot be operated without doffer origin setting. The minimum required settings and adjustments for RX operation are arranged on this screen. Always check the settings after initial installation or CPU board replacement.

(1) Initial setting-adjustment menu screen

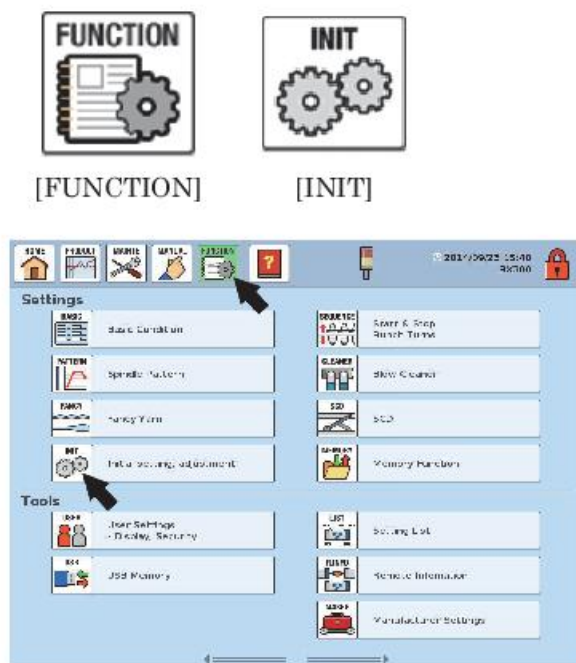


Fig.1 Function menu screen

Select the [INIT] icon from the function menu displayed by touching the [FUNCTION] icon on the top menu to display the password input screen (Fig. 2).



Fig.2 Password input screen

Input password “1414” and touch the [Enter] key to display the initial setting-adjustment screen (Fig. 3).

■ Explanation on contents of display screen



Fig.3 Initial setting-adjustment screen



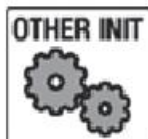
Touch this icon to set machine specifications such as the maximum speed, ring diameter, and bobbin shape.



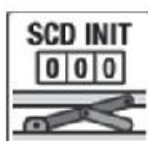
Touch this icon to set various coefficients for correction.



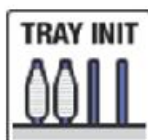
Touch this icon to set ring rail origin.



Touch it when the back light off time or others is set.



Touch this icon to adjust SCD doffer motion and timer (only when the SCD doffer is provided).



Touch this icon to adjust the SCD tray feeding motion and the TBC timer (only when the SCD doffer is provided).

[BACK] switch: Touch this switch to return to the function menu.

To return to the home screen, touch the [HOME] icon on the top menu.

[2.5] Doffer Motion Adjustment

(1) Doffer motion adjustment screen display



Fig.1 Function menu screen



[SCD INIT]

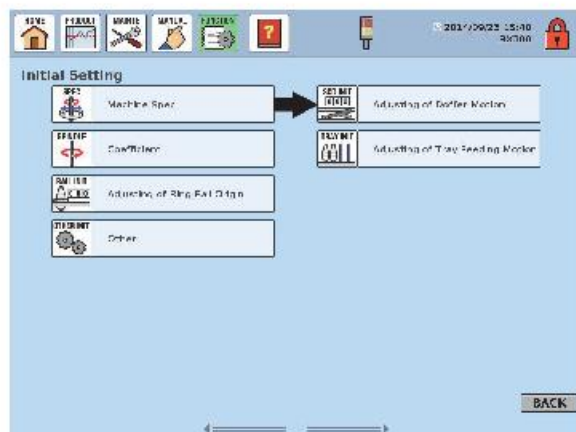


Fig.2 Initial setting-adjustment screen

- (1) Before adjusting the doffer position adjustment, adjust the ring rail origin.
- (2) On the screen displayed by touching the [FUNCTION] icon on the top menu, select the [INIT] icon for initial setting adjustment to display the password input screen.
- (3) Input password "1414" and touch [ENTER] to display the initial setting-adjustment screen (Fig. 2).

- (4) Touch [SCDE INIT] icon (for doffer motion adjustment) to display the doffer position adjustment screen.
 - The screen is as shown in Fig. 3 when the origin setting is incomplete (warning message W-69A is displayed).
 - The screen is as shown in Fig. 4 when origin setting is incomplete.

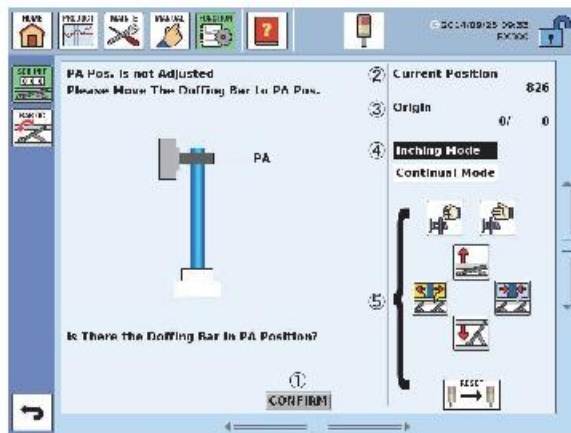


Fig.3 Doffer motion adjustment screen (when origin setting is incomplete)

■ Explanation on contents of screen display in Fig. 3

- ① Doffing bar PA position check switch
- ② Current doffing bar position (pulse count)
- ③ Origin (preceding value/standard value): Pulse count upon detection by PRS22
- ④ Manual up/down movement mode select switch

[INCHING MODE]:

- Moves the bar up/down for a very short time.

[CONTINUAL MODE]:

- Moves the bar continually.
- Stop switch operation is necessary to stop the movement.

- ⑤ Doffer manual operation

- (Up/down, open/close, gripper + alarm reset)

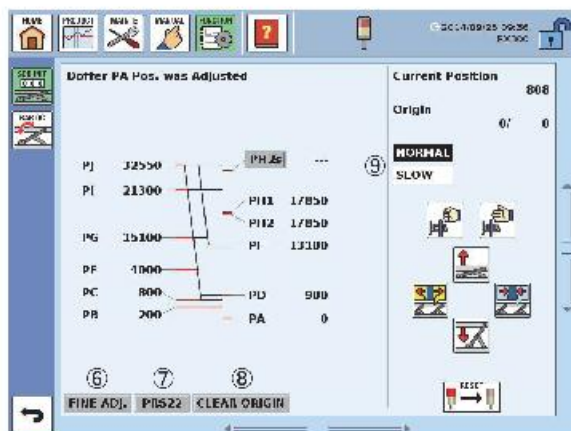


Fig.4 Doffer position adjustment screen (upon completion of origin setting)

■ Explanation on contents of screen display in Fig. 4

- ⑥ Doffer position fine adjustment switch
- ⑦ PRS22 origin position clear switch
- ⑧ Clear PA origin switch
- ⑨ Manual up/down movement mode select switch

[NORMAL] mode:

- The bar moves at the specified varying operation speeds.

[SLOW] mode:

- The doffing bar moves at the low speed in the entire range.

(2) PA position setting

When the PA position has not been set (with W-69A being displayed), or when the origin is cleared forcibly (refer to Subsection 6B [2.5] [5]), PA setting is necessary. Without this setting, specified doffing bar movement fails.



Fig.5 Doffer position adjustment screen

- (1) Set the key switch to the DATA-SET position.
- (2) Use the manual operation switches ⑤ on the doffer position adjustment screen to move the bar to the specified position.

NOTE:

- Check adjustment of the safety sensor (PRS21) before moving the bar.
- In this stage the bar does not stop at the optimum position. Is any danger is felt, stop the operation by pressing the emergency stop switch.

Select the [Inching Mode] from the manual up/down mode select switches ④, and touch the bar down  or up  icon for automatic stop with relatively little travel.

Select this mode when the bar is near the PA position.

In the [Continual Mode], the bar does not stop automatically. Press the SCD stop switch or emergency stop switch to stop the bar movement.

- (3) When the bar can be stopped near the PA position, touch [CONFIRM] switch ①.
- (4) The safety sensor (PRS21) adjustment confirmation screen appears. Confirm adjustment of the safety sensor and touch the [CONFIRM] switch.



Fig.6 Safety sensor (prs21) adjustment confirmation screen



Fig.7 Teaching start screen

- (5) The teaching start screen appears. Press the [START] switch to start teaching operation.

REFERENCE: In the teaching operation, repeat automatic up/down operation between PA and PC several times to assess overrun at each position beforehand.

NOTE: Start the operation after making sure of safety without any obstacle around.

If any abnormality occurs, stop the operation by pressing the emergency stop switch.

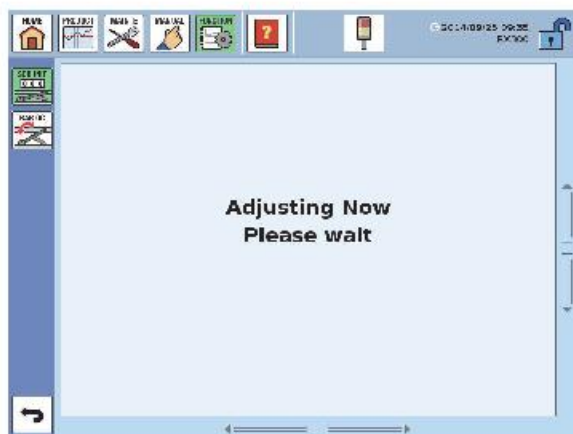


Fig.8 Teaching in progress screen

- (6) During the teaching operation, the screen at left appears. Do not touch this screen while teaching is in progress.



Fig.9 PA Origin adjustment completion screen

- (7) The screen at left appears upon completion of teaching operation. Touch the [CONFIRM] switch to display the doffer position adjustment screen (Fig. 10).

NOTE: If any trouble occurs during teaching, take the respective corrective action and repeat PA position adjustment.

- (8) After the end of PA origin adjustment, make fine adjustment of each operating position (PB through PJ). (Refer to Subsection 6B [2.5] [3].)

(3) Doffer position fine adjustment

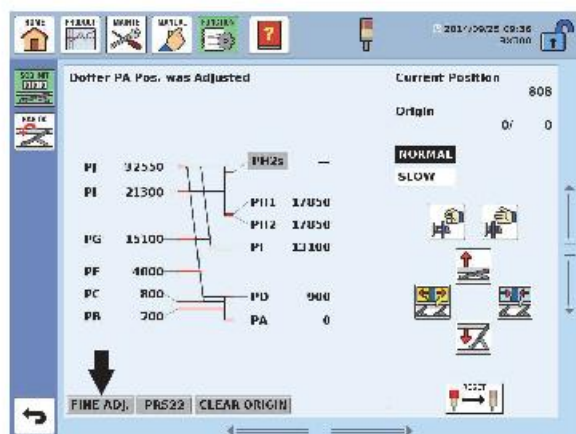


Fig.10 Doffer position adjustment screen (upon completion of origin setting)

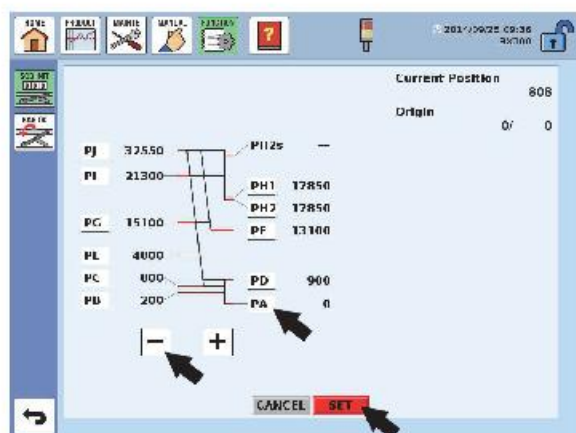


Fig.11 Fine adjustment screen

- (1) Set the key switch to the DATA-SET position.
- (2) Touch [FINE ADJ.] switch on the doffer position adjustment screen.

- (3) The fine adjustment screen appears.
- (4) Touch the white portion of the position desired to be adjusted (to turn it black), and touch [+] for upward correction, and [-] for downward correction.

REFERENCE: A single touch adjusts about 0.2 mm.

- (5) After fine adjustment of the value, touch the [SET] switch to set the data. Touch one of the manual doffer operation icons to stop the operation at the adjusted position, and confirm the stop position.
- (6) After the end of fine adjustment, reset the key switch to its previous position.

REFERENCE: In manual operation on the doffer position adjustment screen, low-constant-speed bar up/down operation is possible in addition to the normal operation (bar control at specified varying speeds). This can be selected by either the [NORMAL] or [SLOW] mode select switch above the manual doffer operation icons.

(4) Clear origin (PRS22)

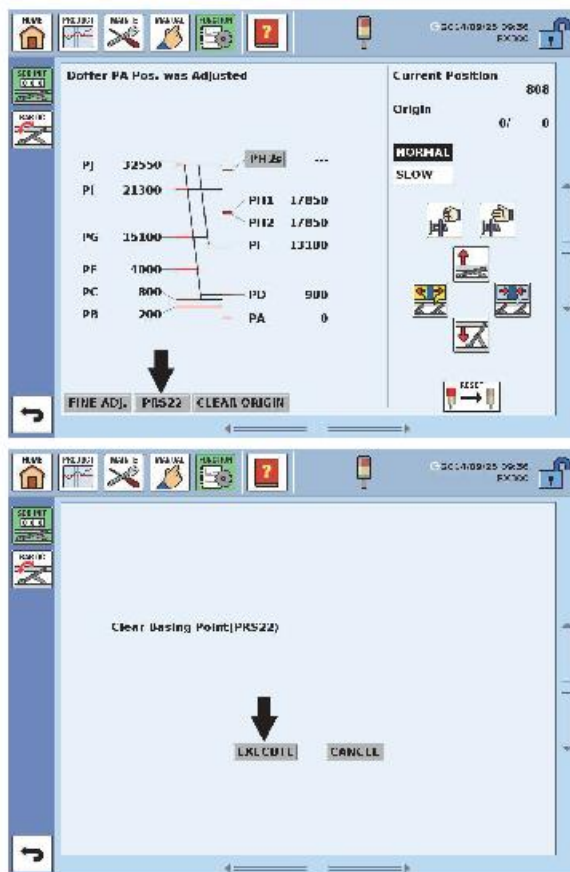


Fig.12 PRS22 clear

(5) Clear PA origin

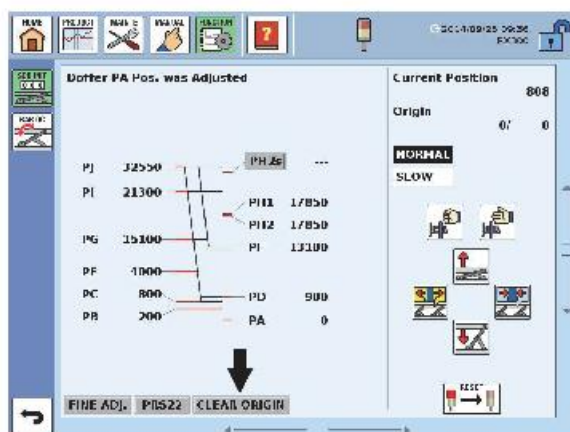


Fig.13 Doffer position adjustment screen

The origin is detected by the first PRS22 detection after the start of automatic doffer operation.

The deviation between the bar position recognized in the program and the actual position is detected by means of this origin pulse.

If the deviation is excessive, the operation is stopped with E-52B display.

In this case, skipped tooth of the doffer driving timing belt may be the reason.

Check the bar heights on the R and L sides, and make necessary adjustment.

To obtain the PRS22 origin position, ORS22 must be cleared once.

Touch the [PRS22] switch on the doffer position adjustment screen to display the confirmation screen, and touch the [EXECUTE] switch.

(Set the key switch to the DATA-SET position before this operation.)

Clear the PA origin when setting positions PA through PJ again after canceling them once.

Touch the [CLEAR ORIGIN] switch on the doffer position adjustment screen to display the confirmation screen, and touch the [EXECUTE] switch.

(The key switch must be set to the DATA-SET position before this operation.)

When the PA position is cleared, the doffer cannot be operated normally. It is necessary to set the PA origin again. (Refer to Subsection 6B [2.5] [2].)

[2.6] Doffer Timer Setting

(1) Doffer open/close time adjustment

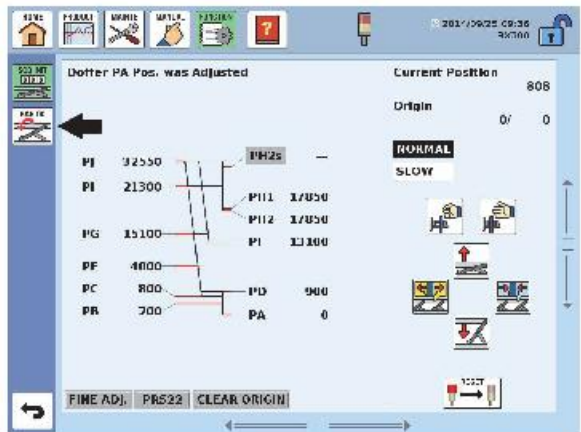


Fig.1 Doffer position adjustment screen

Touch the [BAR OC] icon in the sub menu on the doffer position adjustment screen to display the doffer operation check timer screen (Fig. 2).

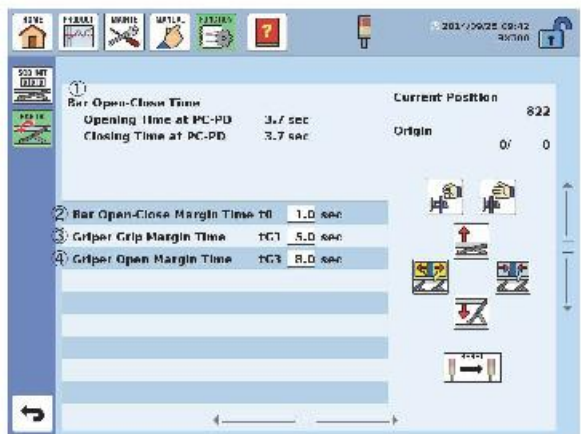
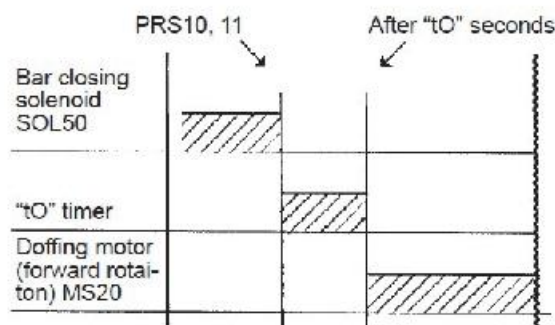


Fig.2 Doffer motion check timer screen

- Doffer open/close time adjustment ①
Indicates the doffer opening time and closing time when the doffer is in the loading position (between PC and PD). The value is updated after each opening and closing in the loading position. Perform manual opening and closing and adjust the air pressure for appropriate opening/closing time.
(Standard opening/closing time: about 4 to 5 seconds)

Timing of "tO" Timer Operation



■ "Bar Close Timer"(tO) ②

This "tO" timer counts the time length during which the SCD should wait for the doffing bar to almost finish swinging after the end of bar closing. After the time length preset in this timer, the SCD starts bar lowering operation.

Typical tO value:

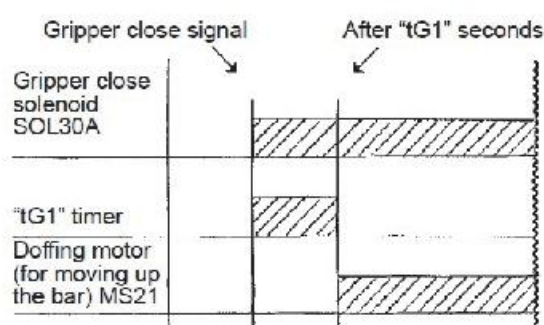
- 0.5 second (for 480 spindles or less)
- 1.0 second (for more than 480 spindles)

If the value is inappropriate, the following conditions may result:

Set time	Error
Too long	It wastes so much waiting time, so the doffing operation takes too much time.
Too short	The SCD will fail to align bobbins with spindles, resulting in a serious problem such as bobbin insertion miss.

REFERENCE: If the doffing bar does not stop swinging within 5 seconds, it is necessary to adjust the doffing bar opening/closing speed. (Refer to Subsection 4B [3].)

Timing of "tG1" Timer Operation



■ "Gripper Grip Timer"(tG1) ③

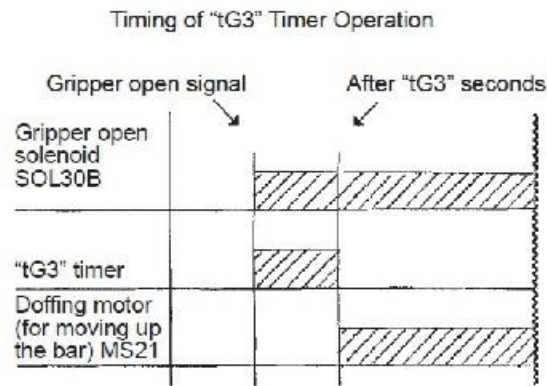
This "tG1" timer counts the time length during which the air pressure should be applied to the gripper for gripping bobbins.

Typical tG1 value:

- 2.0 seconds (for 480 spindles or less)
- 5.0 seconds (for more than 480 spindles)

If the value is inappropriate, the following conditions may result:

Set time	Error
Too long	It wastes so much waiting time, so the doffing operation takes too much time.
Too short	A bobbin grip miss will occur, resulting in a serious problem.



■ "Gripper Release Timer"(tG3) ④

This "tG3" timer counts the time length required for ejecting the air pressure from the gripper to release bobbins.

Typical tG3 value:

- 3.0 seconds (for 480 spindles or less)
- 8.0 seconds (for more than 480 spindles)

If the value is inappropriate, the following conditions may result:

Set time	Error
Too long	It wastes so much waiting time, so the doffing operation takes too much time.
Too short	A bobbin release miss will occur, resulting in a serious problem.

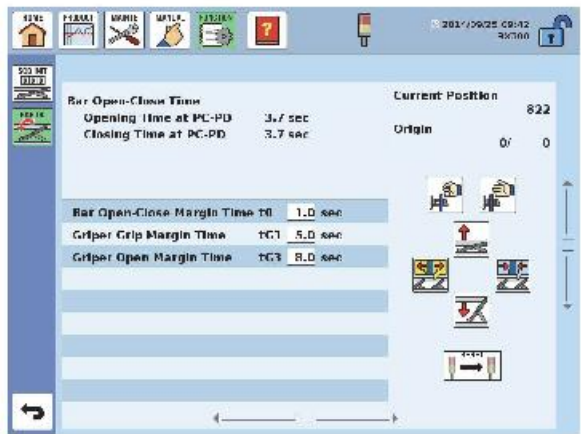


Fig.3 Doffer motion check timer screen

After the end of setting, touch the [SET] switch to enter the data.

(2) Tray timer setting



[TRAY INIT]



Fig.4 Initial setting-adjustment screen

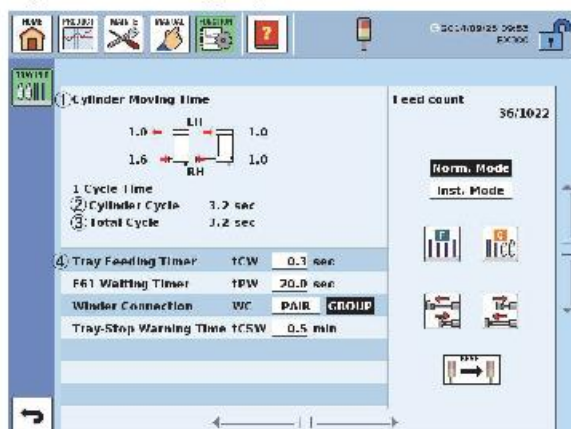


Fig.5 Tray adjustment screen

Touch the [TRAY INIT.] icon on the initial setting-adjustment screen to display the tray motion check timer screen (Fig. 5).

- Tray cylinder motion time adjustment ①
 - The time values lengths required for feed and return motions of tray cylinders LH and RH are indicated.
 - The respective value is updated each time the tray cylinder is operated.
 - Manually feed and return the tray cylinders, and adjust the air pressure for an appropriate motion time. (Standard operation time: 4 to 4.5 seconds for feeding, 1 to 1.2 seconds for returning)
- Tray 1-cycle time ②
 - When the tray is operated, the time required for one tray feed and return cycle is indicated. The value is updated upon completion of each cycle.
- Total cycle time ③
 - The cycle time from the start of automatic tray feeding to the start of next tray feeding including the waiting time is displayed. The value is updated each time the feeding operation starts.
- Tray Feeding Timer (tCW) ④
 - The pause timer (tCW) is provided for interposing a pause between the air cylinder feeding operation and retracting operation or between the retracting operation and feeding operation.
 - Typical tCW value: 0.3 second
 - If the value is inappropriate, the following conditions may result:

Set time	Error
Too long	It will take much time for all spindles to complete feeding.
Too short	Bobbins on the trays will shake greatly.

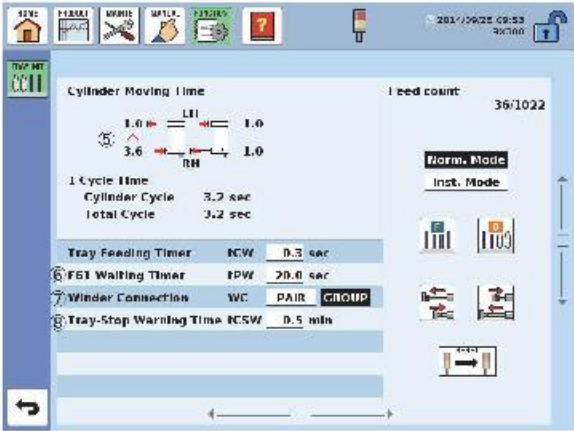


Fig.6 Tray adjustment screen

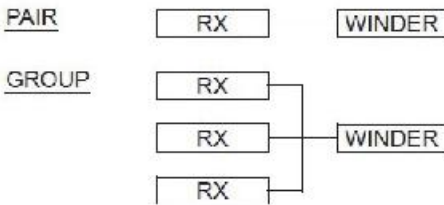
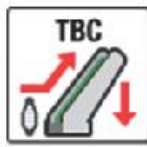


Fig.7 Tray adjustment screen

- Cylinder speed alarm display ⑤
Alarm such as W-79A or W-79B is output when the cylinder motion speeds on the carrying-in and carrying-out sides are unbalanced. The cylinder motion time then is displayed in red, with an inequality signal showing the speed balance.
(In the case of Fig. 6, the carrying-in motion of the R side cylinder is much more than the carrying-out motion of the L side cylinder.)
- Abnormal tray position detection time (tPW) ⑥
Set the timeout time until abnormal tray position detection by the incoming tray sensor (PH60) (initial value: 20 seconds).
- Winder Connection (WC) ⑦
You choose the winder connection type by touching the [PAIR] or [GROUP] switch.
[PAIR] : For a winder connected to a single RX.
[GROUP] : For a winder connected to more than one RX.
After the end of setting, touch the [SET] switch to enter the data.
- Tray Stop Warning Time (+CSW) ⑧
Set the time before the warning message is displayed when the tray is stopped before the tray conveyance completes.

(3) TBC setting items (TBC specification only)



[TBC]

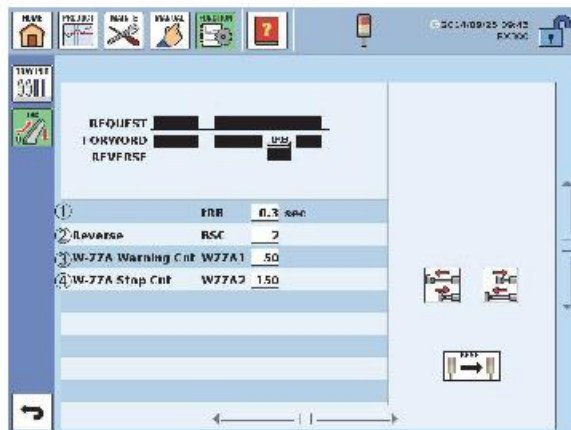


Fig.8 TBC motion setting screen

Touch the [TBC] icon in the sub menu on the tray motion check timer screen to display the TBC motion check setting screen.

■ Explanation on contents of screen display

- ① tRB : Drum reversing time upon bobbin jamming
(initial value: 0.3 sec)
- ② BSC : Drum reverse rotation count upon bobbin jamming
(initial value: 2 rotation)
- ③ W77A1: The number of trays after the bobbins within the hopper become undetectable and before the warning is displayed
(initial value)
 6 inch bobbin: 100
 7,8 inch bobbin: 50
 9 inch bobbin: 35
- ④ W77A2: The number of trays after the bobbins within the hopper become undetectable and before the tray is stopped
(initial value)
 6 inch bobbin: 200
 7,8 inch bobbin: 150
 9 inch bobbin: 135

(Refer to Subsection A.1A.3 [3] in TBC operation manual.)

After the end of setting, touch the [SET] switch to enter the data.

[3] SCD Running Condition Setting

Set the SCD running conditions.

[3.1] Running condition setting

- (1) Open the SCD running condition setting screen.

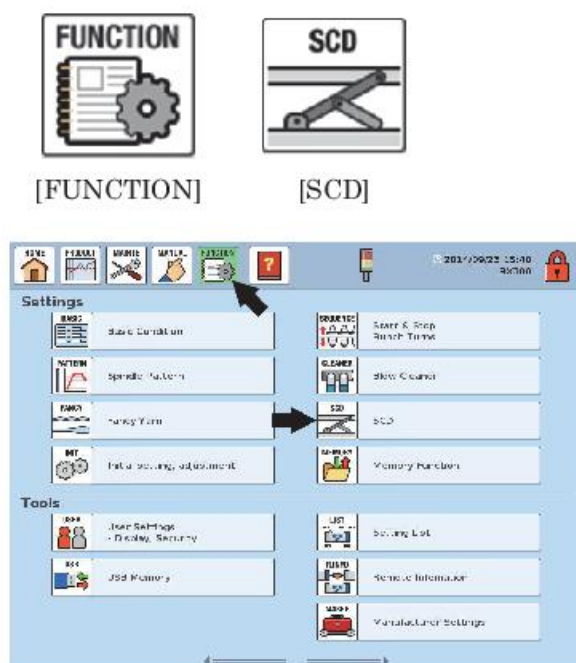


Fig.1 Function menu screen

Touch the [FUNCTION] icon on the top menu to display the function menu, and touch [SCD] icon in the devices group on the function menu.

The SCD running condition setting screen (Fig. 2) appears.

(2) SCD running condition setting items

Fig.2 SCD Running Condition Setting Screen



- ① STY
Refer to Section 6B.7 [2] in RXSCD manual.
- ② DCS
Refer to Section 6B.7 [2] in RXSCD manual.
- ③ • DSbc
• DStray
• DSide
Refer to Section 6B.7 [2] in RXSCD manual.
- ④ CS
Refer to Section 6B.7 [2] in RXSCD manual.
- ⑤ CFP (TBC specification only):
Refer to Subsection A.1A.3 [3] in the TBC operation manual.
- ⑥ CFC: Tray feed supplementing count
(SPC + CFC = Specified tray feed count)
REFERENCE: Refer to Subsection A.1A.3 [3] in the TBC operation manual.

After the end of setting, touch the [SET] switch to enter the data.

[3.2] SYNC running condition setting



[SYNC]

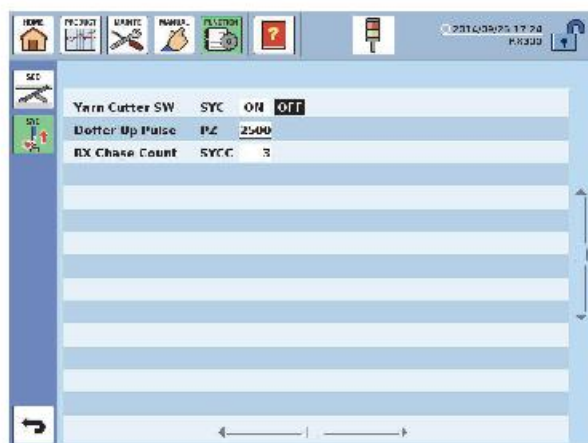


Fig.3 SYNC running condition setting screen

Touch the [SYNC] icon in the sub menu on the SCD running condition setting screen (Fig. 2) to display the SYNC running condition setting screen.

■ Explanation on contents of screen display

- ① SYC Refer to Section 6B [7.2] in RXSCD manual.
- ② SYCC After the end of setting, touch the [SET] switch to enter the data.

[4] I/O Monitor

[4.1] I/O Monitor Reference Method

(1) Check screen display

Touch the [MAINT] icon on the top menu, and touch the [CHECK] icon on the sub menu to display the check screen.

First, a drive system information screen is displayed.

On this screen, it is possible to refer to the drive system running information and the I/O (input/output) monitor.

It can be used for RX trouble identification.



Fig.1 Drive System Information Screen

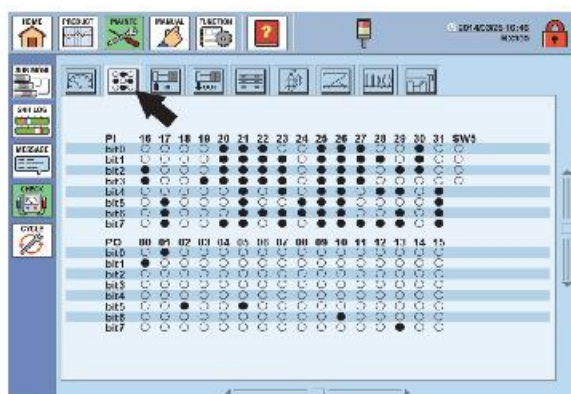


Fig.2 I/O Monitor (Matrix)

(1) RX drive system information display

Touch the  icon at the top of the screen. This screen displays the target rpm of each of the spindle, draft and lifting as well as the basic information about each servo amplifier and inverter.

(2) I/O monitor (matrix)

Touch the  icon at the top of the screen. This screen allows overall view of the states of all inputs and outputs.

Explanation on contents of screen display

○ : OFF

● : ON

• Inputs : PI16 through PI31 (bit 0 to bit 7)

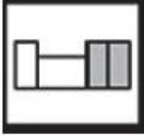
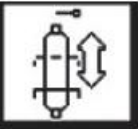
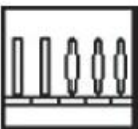
• Outputs : PO00 through PO15 (bit 0 to bit 7)



Fig.3 I/O monitor (by device)

- (3) I/O monitor (by device)
- For standard inputs and outputs, names and corresponding electrical components are displayed in groups for each RX. The following icons discriminate the devices:

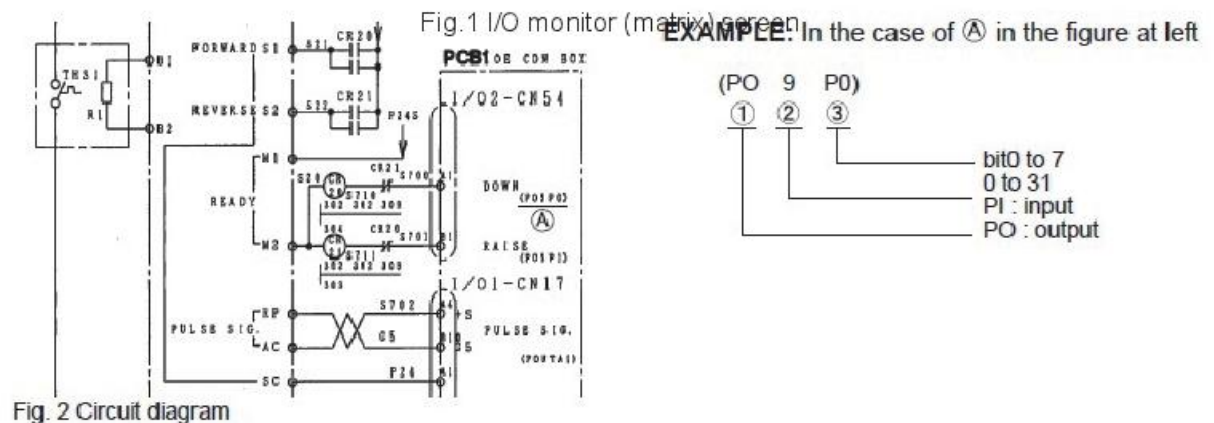
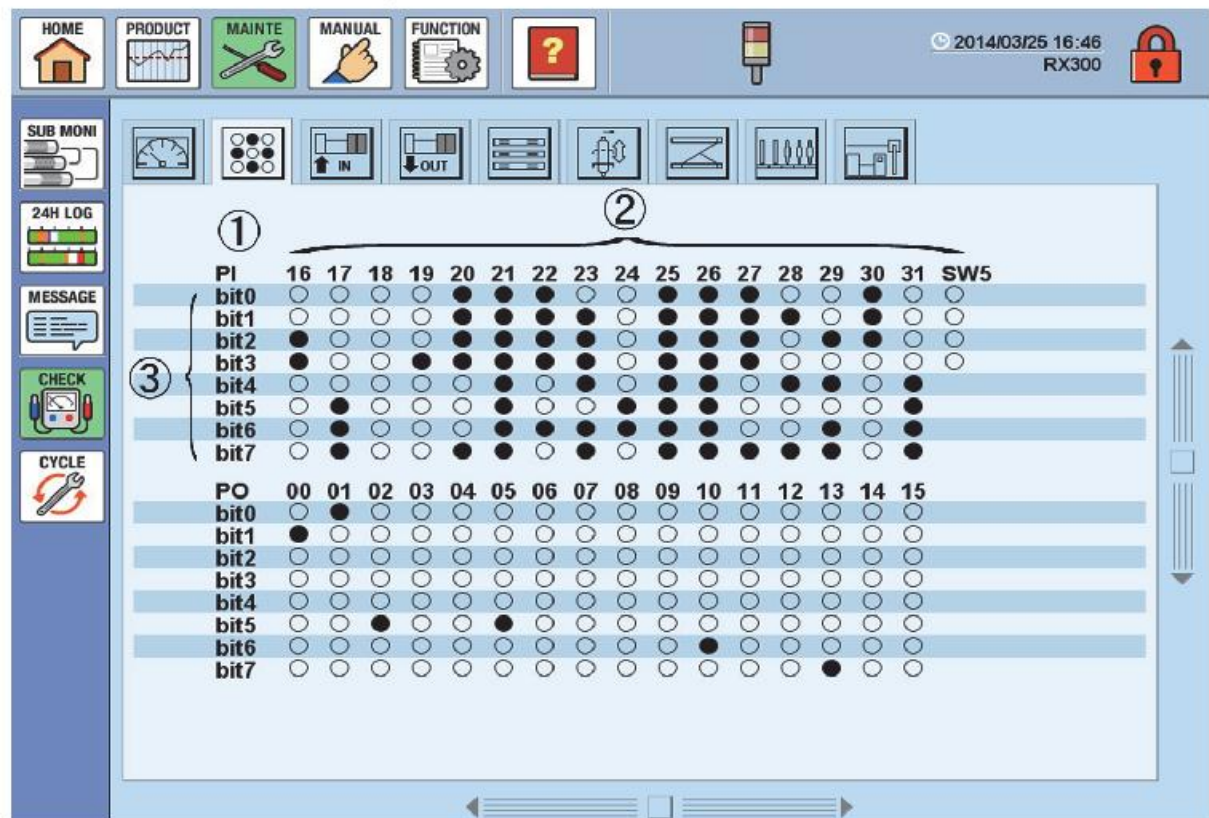
Since the manual operations for each device are shown on each screen, it is also possible to refer to the change in I/O by each operation.

-  RX machine (including spindle drive)
-  Draft drive system
-  Lappet and ring rail system
-  Doffer system
-  Tray system
-  Blow cleaner system

[4.2] I/O Monitor Matrix and Circuit Diagram

(1) I/O monitor matrix and circuit diagram

The numbers in the circuit diagram are the same as those in the matrix. (① - ①、② - ②...)



(2) I/O monitor display (by device) and circuit diagram

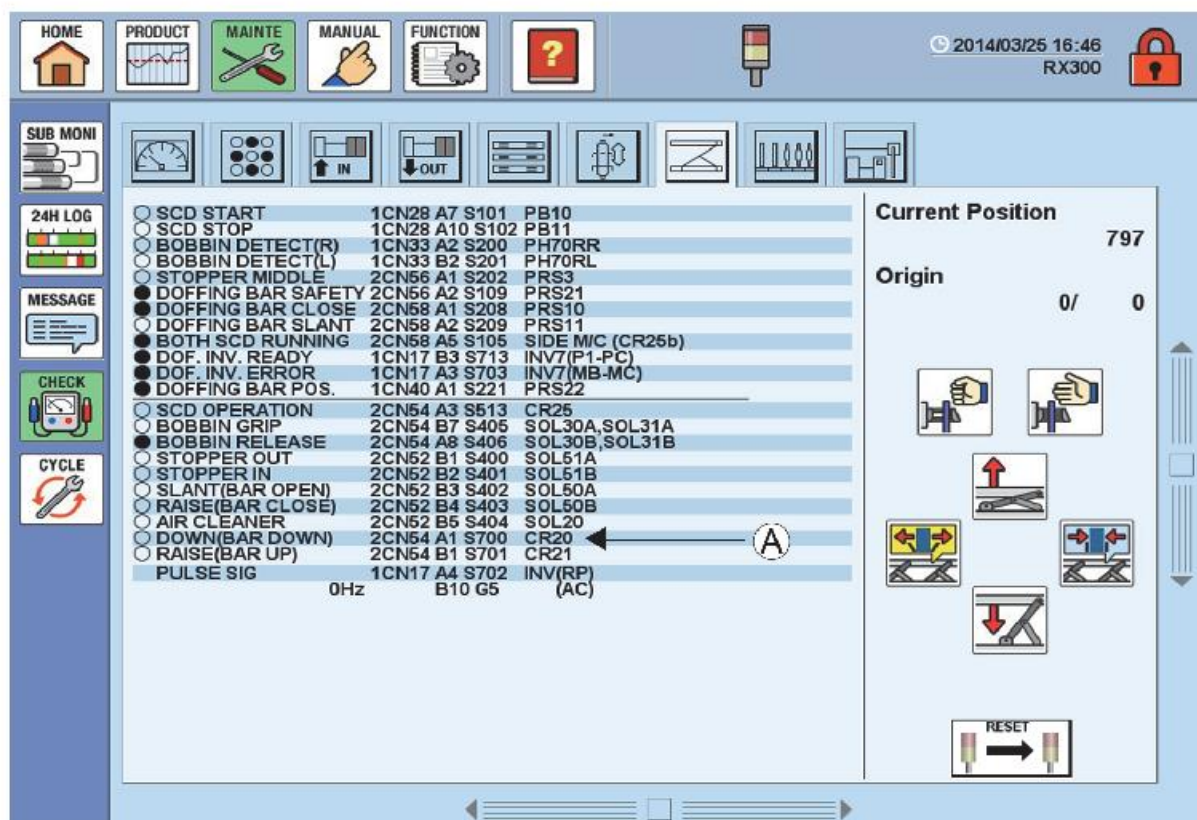


Fig.3 I/O monitor (by device) screen

EXAMPLE: In the case of ① in Fig. 3

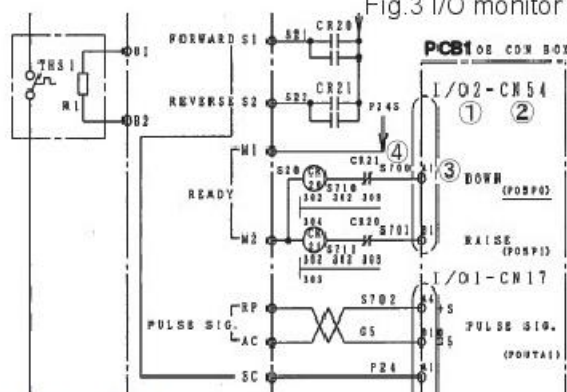
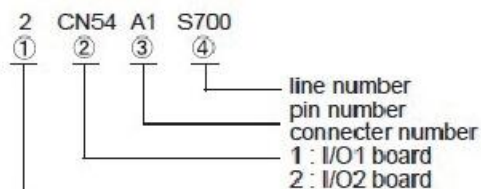


Fig. 4 Circuit diagram



[5] Manual Operation

[5.1] Manual operation screen



[MANUAL]

Touch the [MANUAL] icon on the top menu to display the manual operation menu screen.

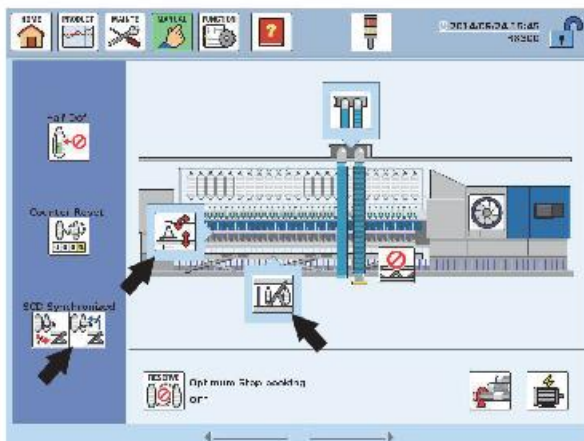


Fig. 1 Manual operation menu screen

(1) Doffer lock setting

Touch the [Doffer Lock] icon when the doffer is in the loading position to lock doffer operation.



[Doffer Lock] icon
(White: Unlocked, Yellow: Locked)

(2) SCD synchronized/non-synchronized setting [SCD Synchronized] icon (on machine with SCD only)



Touch this icon to enable/disable synchronized operation between the SCD and RX.

*It is set whether synchronized operation is enabled/disabled from the RX to the SCD or from the SCD to the RX.



(White: Not synchronized)



(Green: Synchronized)





[DOFFER TRAY]



Fig.2 SCD manual operation screen

(3) SCD manual operation

Touch the [Doffer-Tray] icon to display the SCD manual operation screen. Manually operate the doffer and tray on this screen.

NOTE: Thoroughly check no worker or obstacle in the neighborhood before starting operation.

The SCD manual operation screen displays the following information:

- ① Current Position:
 - Current doffer encoder position pulse
- ② Origin:
 - Memorized position where the PRS22 turns from OFF to ON last time/
position where the PRS22 turned from ON to OFF at the time of first doffing
- ③ Feed count:
 - Current feed count/specified feed count

[5.2] Doffer manual operation



Perform manual operation using the following icons according to the doffer bar position:

- (1) Gripper grip/release
(Refer to Subsection 5B [2.3] (4).)



Gripper [Release] icon
(Lit: released state)

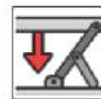


Gripper [Grip] icon
(Lit: Gripping state)

- (2) Doffing bar up/down
(Refer to Subsection 5B [2.3] (5).)



Bar [Up] icon



Bar [Down] icon

- (3) Doffing bar open/close
(Refer to Subsection 5B [2.3] (6).)



Bar [Open] icon



Bar [Close] icon

[5.3] Tray manual operation

Perform manual operation using the following icons according to the doffer bar position:

- (1) Finish/clear (Refer to Subsection 5B [2.3] (2).)

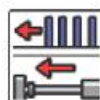


Tray feed [Clear] icon
(Lit: Feeding incomplete state)

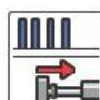


Tray feed [Finish] icon
(Lit: Feeding completed state)

- (2) Tray cylinder manual operation
(Refer to Subsection 5B [2.3] (3).)



Tray [Feed] icon
(Lit: Feeding state)



Tray [Back] icon
(Lit: Returned state)

[6] SCD-related Screen Hierarchy

Top menu	Screen description	Related section
HOME		
HOME 	HOME screen Displays the doffer, tray and TBS statuses.	6B [2.2]
MANUAL operation		
MANUAL 	Manual operation screen Perform manual operation of each device on this screen. Set SCD synchronization and doffer interlocking.	6B [5]
FUNCTION and setting		
FUNCTION 	Various functions and setting menu screen Perform RX initial settings and adjustment-related settings on this screen. Set the operating conditions related to the SCD.	

[6.1] FUNCTION Menu Summary

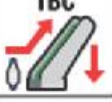
Top menu	Menu screen	Sub menu	Screen description	Related section
FUNCTION and setting				
	Initial setting-adjustment			
		Perform RX initial settings and adjustment-related settings on this screen.		
			• SCD doffer origin setting and fine adjustment	6B [2.5]
			• Doffer timer setting	6B [2.6](1)
			• Tray timer setting	6B [2.6](2)
			• TBC operating condition setting	6B [2.6](3)
	Device setting			
			SCD running condition setting screen • SCD startup timing and other condition setting	6B [3.1]
			• SYC operation setting	6B [3.2]

[7] SCD-related Setting Value List

■ Function menu SCD-related icons and setting value list

REFERENCE: The function menu appears upon touching the [FUNCTION] icon  on the top menu.

[7.1] Initial setting-adjustment

Menu screen	Sub menu	Page	Symbol	Name	unit	Min. value	Max. value	Initial value	Change during operation
		SCD INIT		PA origin (teaching in installation mode)	pls				×
		SCD INIT		PA-PJ	pls	0	60000	—	○
		BAR OC	tO	Bar open-close check timer	sec	0.0	30.0	1.0	○
		BAR OC	tG1	Gripper grip check timer	sec	0.0	10.0	5.0	○
		BAR OC	tG3	Gripper release check timer	sec	0.0	15.0	8.0	○
		TRAY INIT	tCW	Tray conveyor feed check timer	sec	0.1	5.0	0.3	○
		TRAY INIT	tPW	Abnormal tray position detection time	sec	5.0	100.0	20.0	○
		TRAY INIT	WC	Winder connection method (winder link specification only)	—			Group	○
		TRAY INIT	tCSW	Tray stop warning time	min	0.0	60.0	0.5	○
		TBC	tEB	Shooter overfeed	sec	0.0	9.9	1.5	○
		TBC	tRB	Drum reverse rotation time	sec	0.1	2.0	0.3	○
		TBC	BSC	Drum reverse revolution count	revolutions	0	9	2	○
		TBC	W77A1	Number of W-77A warning	—	0	350	50*	○
		TBC	W77A2	Number of W-77A stop	—	0	350	150*	○

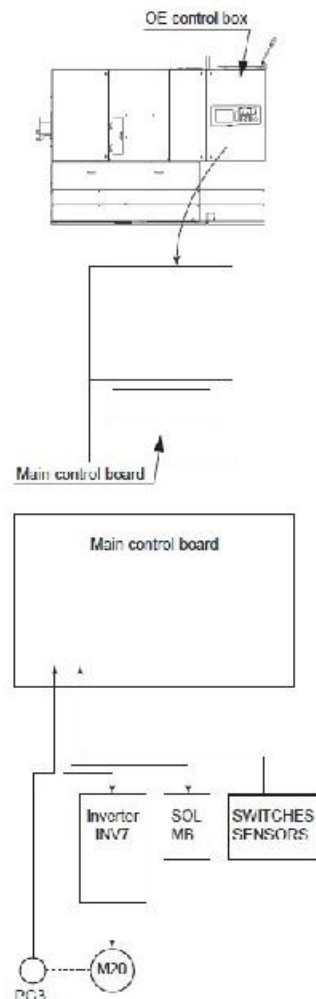
[7.2] Device setting

Menu screen	Sub menu	Page	Symbol	Name	unit	Min. value	Max. value	Initial value	Change during operation
			STY	Doffer startup timing	—	0	1	0	☐
			DCS	Doffer check stop	—	0	1	0	☐
			DS	Doffer startup condition	—	0	15	0	☐
			CS	Conveyor startup timing	—	0	1	0	☐
			CFC	Tray feed supplement count	Preparatory chase count	0	999	14	☐
			CFP	Bobbins (TBC only)	—	1	4	1	☐
			SYC	Split stop pattern	—	OFF	ON	OFF	☐
			PZ	End yarn cut function switch	pls	500	5000	2500	☐
			Sycc	Doffer up pulse	—	2	5	3	☐

7B. INSTRUMENTATION

[1] Functions and Specifications

[1.1] Printed Circuit Boards



The RX has printed circuit boards in the RH control box of the OE as shown at left.

The main control board controls the SCD.

(1) Main control board

1. The main control board issues instructions to the SCD and operates according to fed-back signals, as well as controlling the RX.
2. Acts as input ports for signals sent from the sensors and switches.
3. Acts as output ports for the solenoids, magnet switches, and other devices.
4. Receives signals from the encoder PG3 which feeds back the up- and down-movement amount of the doffing bar. (For encoder PG3, refer to Subsection 7B [1.2].)

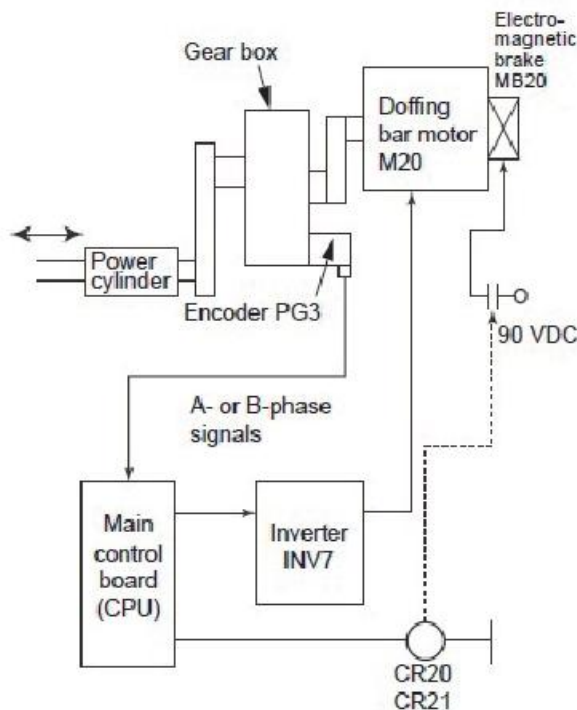
(2) Inverter

The inverter controls the rpm of the doffing up/down motor (M20).

NOTE: When handling printed circuit boards for checking, do not touch them with oily hands or cloths. Oil components may damage printed circuit boards.

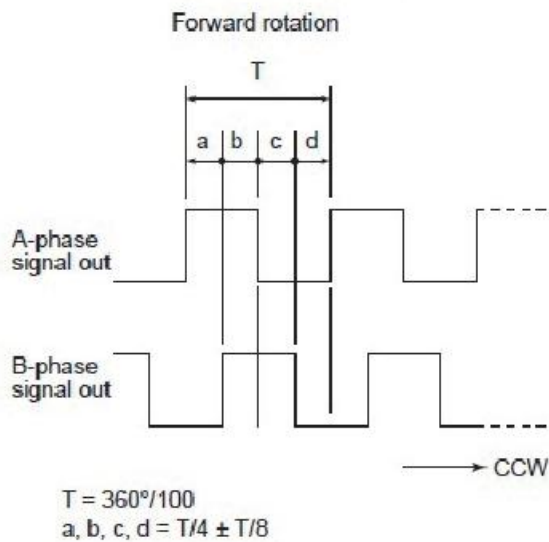
[1.2] Encoder

(1) Encoder-related operation sequence



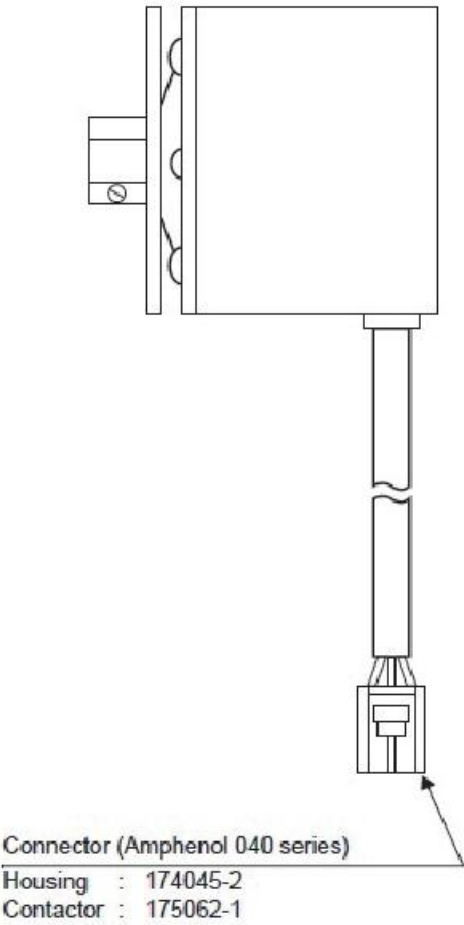
1. The doffing bar motor M20, which is a three-phase motor with brake, drives the power cylinder to move the doffing bar up and down.
2. On the gear box integrated between the motor M20 and the power cylinder is an encoder PG3 which detects the rotation speed and direction of the doffing bar motor.
3. The main control board drives CR20 and CR21 to issue speed command to INV7 for the up/down motion.
4. Encoder PG3 feeds back the rotation pulses to the main control board for comparison with the preset number of pulses for calculation to stop INV7 and turn off CR20 and CR21.
5. The contacts with relays CR20 and CR21 ("a"contacts) cut off the brake power to apply the released brake, and the brake stops the doffing bar.

Encoder output waveform



NOTE: The forward rotation refers to the counter-clockwise rotation when viewed from the motor shaft.

(2) Encoder PG3 specifications and appearance



Pin No.	Tube ID	Signal name
1	P12	+12 V
2	—	—
3	—	—
4	S800	A OUT
5	E12	GND
6	FG	Shield
7	—	—
8	S801	B OUT

7B. INSTRUMENTATION

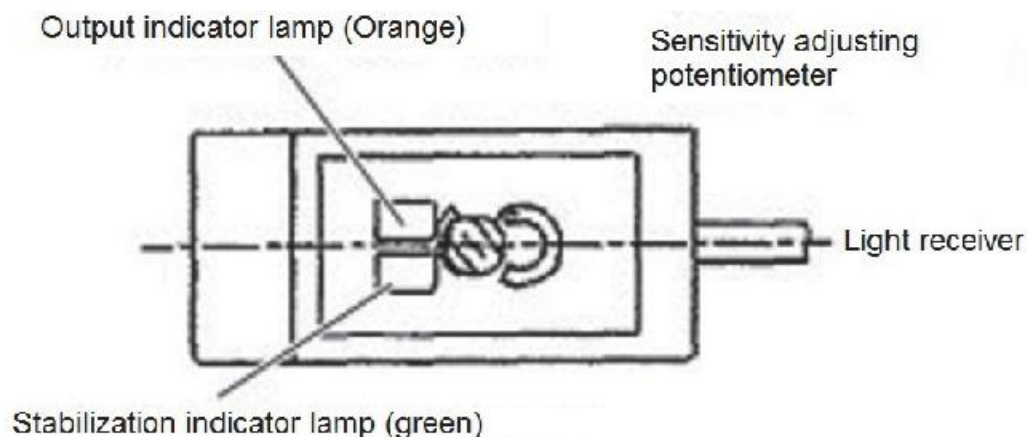
Model	TS5300N250
Function code	OIH38-100C/T-C3-12 V
Power source	DC +12 V $\pm 5\%$
	80 mA Max.

Item	Specifications	Remarks
Code	Gray, binary	
Coding system	INCREMENTAL	
Resolution	100 C/T	
Output signal	"1" TRANSISTOR	OFF
	"0" TRANSISTOR	ON
Output circuit		2SC3734
Output impedance	/	Design value
Flow current	30 mA Max.	When the output is "1"
Max. allowable output current	/	
Max. allowable output voltage	40 V	When the output is "1"
Rise time, Fall time	1 μ s Max.	Design value
Response frequency	200 kHz Max.	
Optical system	LED	
Protection	IP50	
Counting direction	CCW	Viewed from the shaft end

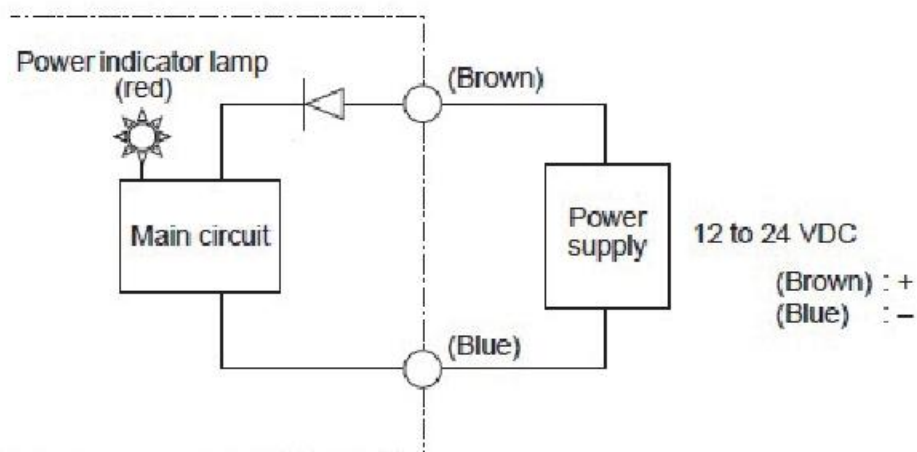
[1.3] Photoelectric Switches

The SCD uses the photoelectric switches specified below.

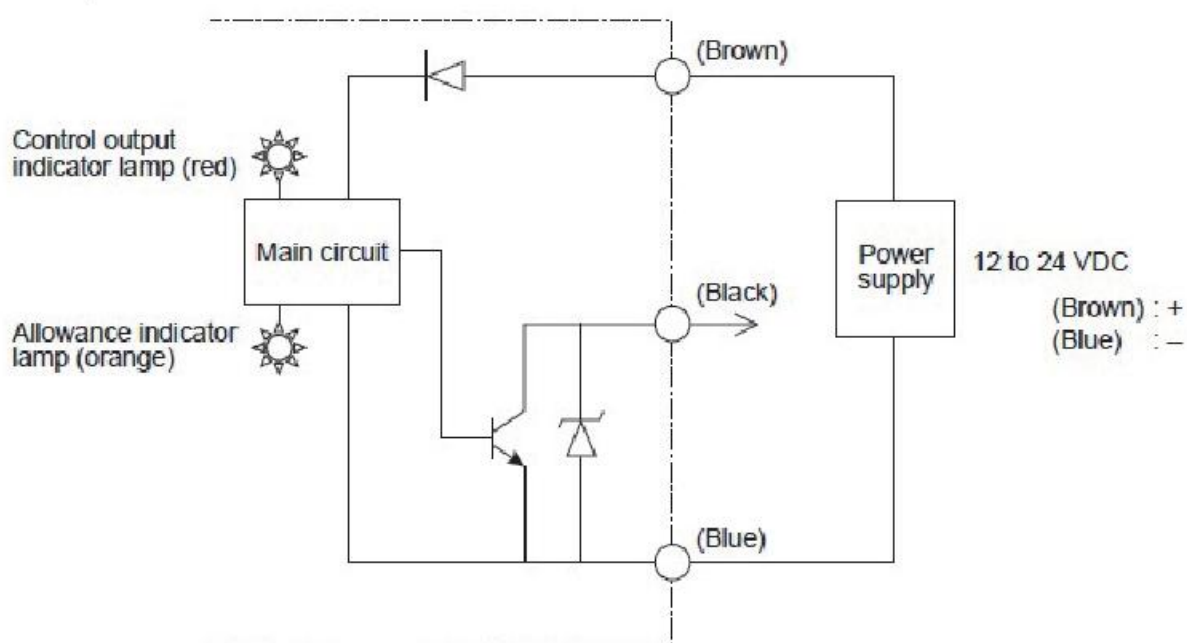
■ External dimensions



■ Projector



■ Light receiver



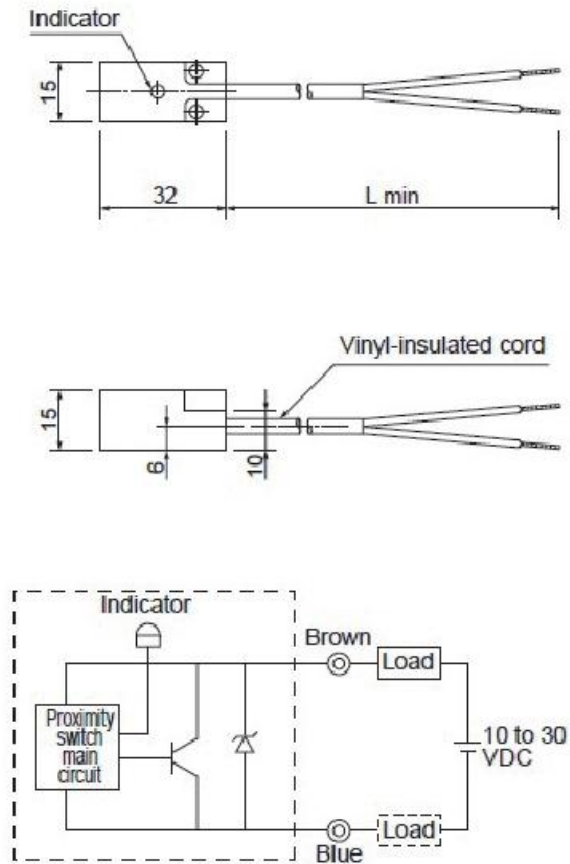
(1) Remaining full-bobbin detection photoelectric switch (PH70)

Name	Transmission type photoelectric switch
Model	PLX-705CD-B (Projector: PNX-705ED-B, Light receiver: PNX-705FCD-B)
Detecting light source	Infrared LED ($\lambda = 635 \text{ nm}$)
Supply voltage	10 to 30 VDC including ripple (p-p) 10 %
Current consumption	35 mA or less
Detection distance	70 m
Detectable object	$\phi 15 \text{ mm}$ or above (spinning frame bobbin)
Response time	0.5 ms or less
Operation mode	ON upon light incoming/ON upon light shielding, switch by wiring
Control output	NPN transistor open collector output 30 VDC, 100 mA or less
Sensitivity adjustment	Two rotation endless potentiometer
Indicator lamp	Projector : Not equipped Light receiver : Stabilization indicator, green LED Output indicator, orange LED
Connection	Drawer type cord cable, $\phi 3.8 \text{ mm}$ 2 m length 4 (light receiver), 2 (projector), 0.3 mm ² , flying lead
Working ambient illuminance	3,000 lx max. (fluorescent lamp), 10,000 lx max. (solar light)
Ambient temperature	In service: -25°C to $+55^{\circ}\text{C}$, storage: -40°C to $+70^{\circ}\text{C}$
Ambient humidity	In service: 35%RH to 85%RH, storage: 35%RH to 85%RH
Insulation resistance	20 M Ω or more (with a 500 VDC megger)
Dielectric strength	1,000 VAC for 1 minute
Vibration resistance	1.5 mm: double amplitude, 10 to 55 Hz: 2 hours each three times in X, Y, and Z directions
Impact resistance	500 m/s ² (approx. 50 G), three times each in X, Y, and Z directions
EMC	EN60947-5-2:2007
Protection structure	IP67 (IEC standard)
Material	Case: ABS (black) with glass fiber, lens: PC (red)
Mass	Projector: Approx. 75 g, Light receiver: Approx. 80 g
Special note	Varnish coating on PC board Compliance with RoHS
Accessories	M4 screws $\times$ 4, M4 nuts $\times$ 4

[1.4] Proximity Switches

The SCD uses the proximity switches specified below.

(1) Proximity switch specifications



Model	FL2R-4J6HD
Detection range	4 ± 0.4 mm
Detectable object	Iron, $18 \times 18 \times 1$ mm
Accuracy	Specified detection range $\pm 15\%$
Rated power voltage	DC 12/24 V
Allowable power regulation	DC 10 ~ 30 V
Leak current	1 mA max.
Output	Transistor
Operation mode	N.O. (Normal open)
Switching capacity	Max. 100 mA
Response frequency	Min. 1.5 kHz
Ambient temperature	-25°C to $+70^{\circ}\text{C}$
Ambient humidity	35 to 95% RH
Protection	IP67 (IEC standard)

8B. TROUBLESHOOTING



⚠ CAUTION

During troubleshooting, be sure to observe the precautions given in Chapter

S.1 "Safe Work"

S.1.2 "Rules for Safe Operation"

S.1.3 "Rules for Maintenance"

S.1.4 "Rules for Operating or Checking the Electrical Devices"

The RX is equipped with inverters, so even after the main circuit breaker (CB1) is turned off, the inverters' capacitors will remain charged for a while. For jobs that require direct contact with the wires, wait at least 10 minutes after turning off the CB1.

[1] Classification of Messages

The messages that the RX can show on the operation panel are divided into the classes given in the table below.

If any message appears, check the contents and take necessary actions.

Class	Contents	Resetting for operation	Remarks
E- * *	- Problems that have arisen when the RX was in operation and have caused the RX to stop. - Operator-unrelated problems that have arisen when the RX was on halt.	Required after taking actions.	These problems will be logged into the "Trouble History," together with the date and time of resetting.
W- * *	- Problems that have arisen when the RX was in operation but have not caused the RX to stop. - Operator-related problems that have been caused when the RX was on halt.	Required after taking actions.	None of these problems will be logged into the "Trouble History."
M- * *	- Operating condition mismatch that does not allow the RX to run. These error messages will appear when the operator attempts to start the RX. - Remedy-requested prompt. These messages will appear when the operator attempts to run the RX without taking necessary remedies (e.g., after the E- * * or W- * * has occurred).	Not required. (The displayed message will automatically disappear.)	
RX_MES: or SCD_MES:	Status messages or operator's careless mistakes.		
Messages only	Messages that appear when the operator accesses the control panel.	Required or not required, depending upon the displayed messages.	
INV7- * *	Problems with the inverter for SCD doffing motors (only for specifications with SCD)	Required after taking actions.	

※For the details of error messages, refer to Section 9.1A "Troubleshooting" in the RX240 Instruction Manual.

MB. LUBRICATION • MAINTENANCE • REPAIR/ADJUSTMENT

[1] Lubrication

Appropriate lubrication is very important not only for extending machine life and saving driving power and maintenance cost, but also for maintaining excellent productivity and quality of spun yarn.

The following gives the types of recommended lubricants, properties, lubricating points, and lubrication interval.

When supplying lubricant, it is recommended that the same brand as the previous one be used.

[1.1] Preparation and Lubricant Storage

- (1) Prepare the following lubrication tools and store them in a ready-to-use state:

- 1) Grease gun (Tool No. 769)
- 2) Brush (Commercially available)

- (2) Before lubrication, make sure that no air is entrapped inside the grease gun.

Air entrapped inside the gun will prevent correct greasing.

Periodically check the feeding amount of grease.

- (3) Before lubrication, check that the grease nipple of each lubricating point is not damaged or broken.



- (4) Lubricant storing notes

1. Seal up the lubricant containers and place them in a well-ventilated room separated from the machine rooms.
2. Avoid storing lubricants for more than one year, since even high-quality lubricants may deteriorate as time passes.
3. Never mix different brands of grease or oil, since mixed grease or oil with different properties will chemically act with each other, lowering the lubricating performance.

[1.2] Types of Lubricants and their Properties

(1) Lubricant types, their symbols, and lubricating points

Lubricant type	Symbol	Lubricating point	Japanese product	Shell	Mobil	ESSO	AGIP	Others
Grease	A	Ordinary ball bearings Piston rods for the tray cylinders	Kyodo, Unilube Grease No.2	Alvania Grease 2	Mobilux Grease EP 2	Beacon EP 2	GR MU2	
	D	Screw shafts and taper roller bearings for power cylinders, spur gears in the gear box, crank leverbrackets, and piston rods for the tray cylinders	Kyodo, Unilube DL No.2 NIPPON OIL CORPORATION Epinok grease AP No.2	Alvania EP Grease No. 2	Mobilux Grease EP 2	Beacon EP 2	GF MUEP2	TG2-026877 (SKF)
	M	Bushings and studs	Sumiko Lubricant, Moly Paste					Molycoat Grease Paste (Alpha Molycoat)
Oil	B	Plain metal sections	JIS Machine Oil ISO VG68	Tellus Oil C68	Mobil DTE26	Teresso 68		

(2) Properties of grease

Manufacturer	Brand name	Symbol	Soap radical	Viscosity (at 25°C)
Kyodo Yushi	Unilube Grease No. 2	A	Li	280
	Unilube Grease DL No. 2	D	Li	280
Shell	Alvania Grease S2	A	Li	276
	Alvania EP Grease 2	D	Li	282
Mobil	Mobilux Grease EP2	A • D	Li	265/295
ESSO	Beacon EP2	A • D	Li	280
Sumiko Lubricant	Moly Paste	M	Special viscosity increasing agent	280
Alfa Molycoat	Molycoat Grease, Paste	M	Li	
AGIP	GR MU2	A	Li	280
	GR MU EP2	D	Li	280

(3) Properties of oil

Manufacturer	Brand name	Symbol	Kinematic viscosity		Viscosity index	Flash point	Pour point
			40°C	100°C			
Showa Shell	Tellus oil C68	B	68.0	8.9	105 or more	256	-25
ESSO	Teresso 68	B	67.3	7.3	109 or more	230	12.5

[1.3] Lubricating Points and Intervals

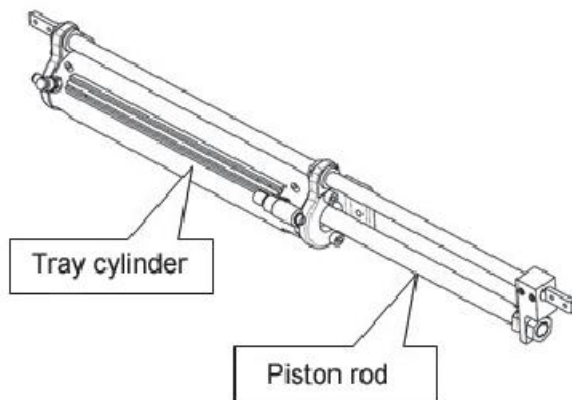


⚠ WARNING

Before starting lubrication, always stop the RX and SCD.

Be sure to put up the warning notice saying "DON'T TURN THE SWITCH ON" in order to prevent persons other than the worker in charge from turning on the switches.

(1) Lubrication intervals every 1,000 hours



■ Piston rod for the tray cylinder

Lubrication tools: Brush

Lubricant type: Lubricant A and D

A & D Piston rod

■ Lubricating procedure

1. Stop the machine with the piston rod extended.
2. Clean fly or fleece from the piston rod and the piston rod entrance.
3. Clean the piston rod with a waste cloth.
4. Use a brush to apply grease on the piston rod.
5. Reciprocate the piston rod 10 times.
6. With the piston rod extended, wipe out the grease on the piston rod with a waste cloth.

(2) Lubrication intervals Every 4,000 hours



- Spur gear in the gear box

Lubrication tools : Grease gun

Lubricant type : Lubricant D

Spur gear in the gear box (Lubricant D)

(3) Lubrication intervals Every 8,000 hours



- Screw shaft
- Taper roller bearing

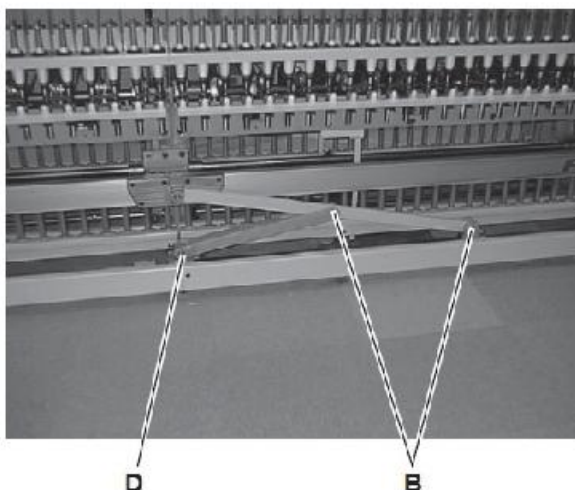
Lubrication tools : Grease gun and brush

Lubricant type : Lubricant D

Screw shaft (Lubricant D) (by brush)

1. Lubricating procedure

- Move the doffing bar down to the Pos A, remove the rubber bushing from the power cylinder, and then apply grease to the screw shaft directly with a brush from the hole. Taper roller bearing (Lubricant D) (by grease gun)



- Crank lever bracket

Lubrication tools : Grease gun and oiler

Lubricant type : Lubricant B and D

Lifter pin (Lubricant B)

Crank lever bracket (Lubricant D)

[1.4] Lubrication Records

SCD No. _____		First recorded _____ H		From(date) _____ To(date) _____											
Lubrication Intervals	Lubricating Points	Lubricant Type	Lubrication												Remarks
			1000H	2000H	3000H	4000H	5000H	6000H	7000H	8000H	9000H	10000H	11000H	12000H	
1000H	• Piston rods for the tray cylinders	A & D	■	■	■	■	■	■	■	■	■	■	■	■	
4000H	• Spur gear in the gear box	D	-	-	-	■	-	-	-	■	-	-	-	■	
8000H	• Screw shaft in the power cylinder	D	-	-	-	-	-	-	-	■	-	-	-	-	
	• Taper roller bearings in the power cylinder	D	-	-	-	-	-	-	-	■	-	-	-	-	
	• Lifter arm pin	B	-	-	-	-	-	-	-	■	-	-	-	-	
	• Crank lever bracket	D	-	-	-	-	-	-	-	■	-	-	-	-	
Other items	• Sealed bearings	—	-	-	-	-	-	-	-	-	-	-	-	-	Replace

Lubrication Intervals	Lubricating Points	Lubricant Type	Lubrication												Remarks
			13000H	14000H	15000H	16000H	17000H	18000H	19000H	20000H	21000H	22000H	23000H	24000H	
1000H	• Piston rods for the tray cylinders	A & D	■	■	■	■	■	■	■	■	■	■	■	■	
4000H	• Spur gear in the gear box	D	-	-	-	■	-	-	-	■	-	-	-	■	
8000H	• Screw shaft in the power cylinder	D	-	-	-	■	-	-	-	-	-	-	-	■	
	• Taper roller bearings in the power cylinder	D	-	-	-	■	-	-	-	-	-	-	-	■	
	• Lifter arm pin	B	-	-	-	■	-	-	-	-	-	-	-	■	
	• Crank lever bracket	D	-	-	-	■	-	-	-	-	-	-	-	■	
Other items	• Sealed bearings	—	-	-	-	-	-	-	-	-	-	-	-	-	Replace

[2] Maintenance

[2.1] Outline

To make the most of the capabilities built in SCDs and extend machine life, the maintenance work given in this section should be performed properly and carefully.

The maintenance (cleaning and inspection) intervals will vary depending upon the type of fibers used, yarn number count, spinning facilities of your plant, and other conditions. This section gives you the typical maintenance intervals and procedures for producing combed cotton yarn of Ne 40.

■ The maintenance work is classified into the following four types:

- Daily cleaning which should be carried out by operators.
- Periodical cleaning which should be carried out at intervals of 3 months and requires that the SCD and RX should be stopped. (including inspection)
- Periodical maintenance (cleaning, inspection and adjustment) which should be carried out at intervals of 6 months and requires that the SCD and RX should be stopped. Note that the first maintenance should be carried out after three months from the first operation.
- Special maintenance which should be carried out yearly. It consists of inspection, adjustment and replacement.

Bearings used in the SCD should be handled carefully according to the general bearing handling rules. They should be lubricated according to the rules given in Section MB.1 “Lubrication”.

After completion of maintenance work, be sure to have the maintenance supervisor inspect the job.

[2.2] Precautions for Maintenance Work



CAUTION

- Always turn the power off before making any adjustments or repairs to correct problems occurring during maintenance or operation.
- If you power off the machine, be sure to put up the warning notice specified in your plant onto the power switch.
- Before starting maintenance work, be sure to make a safety check. During the maintenance work, particularly, be careful with adjacent RXs. If the yellow lamp of the signal indicator on any adjacent RX comes on, leave the inter-frame passages immediately.
- When the operator has to leave the maintenance carts, always bring them out from the inter-frame passages in order to prevent serious accidents with an SCD.
- When the doffing bar is in operation, never stand in the inter-frame passages.

(1) Key points for cleaning and inspection

■ Key points for cleaning and inspection

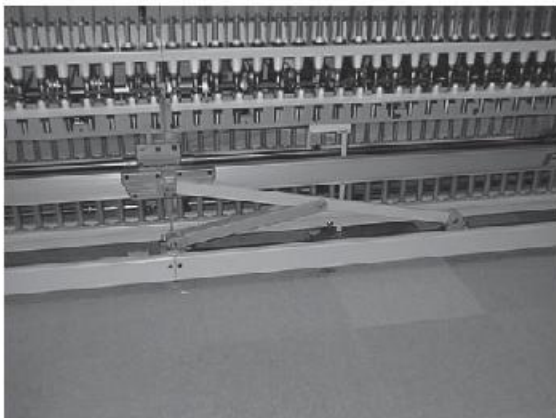
1. For new machines, make the cleaning interval shorter since their parts are coated with rust-preventive oil. After the oil is removed completely, apply the specified standard interval.
2. When performing the routine maintenance for the rotating sections while the machine is in operation, take extra care to prevent bodily injury or property damage.
3. Be sure to clean those sections that are in direct contact with fiber.
4. For the periodical and special maintenances, prepare the schedule and recording lists and perform maintenance according to them.

■ Key points for disassembly or replacement of parts

1. When disassembling the machine, remove parts in the specified order. Never remove them forcibly.
2. During disassembly work, be sure to reinstall removed bolts and nuts to the original position not to lose them.
3. Do not put removed parts directly on the floor. Prepare plates or thick paper on which those parts should be placed.
4. If any damaged parts are found, immediately repair or replace them with spare parts.

[2.3] Daily Cleaning, Inspection and Maintenance

(1) Daily cleaning



1. Cleaning Interval : When necessary

- Determine the cleaning intervals for the SCD components given below depending upon the roving used and the yarn number count, in order to prevent those components from becoming affected by the accumulated fly or fleece. Clean those components according to the scheduled intervals.

Tools:

- Brush
- Hand picker
- Take-up rod
- Floor brush

[Doffing bar]

- Clean fly or fleece from grippers.

[Main shaft]

- Clean fly or fleece from the main shaft.

[Power cylinder]

- Remove fly or fleece accumulating around the cylinder.

[Intermediate step bar]

- Remove fly or fleece accumulating around the pegs.

[Tray transfer section]

- Clean the tray transfer section if entangled with fibers or clogged with fiber dust.

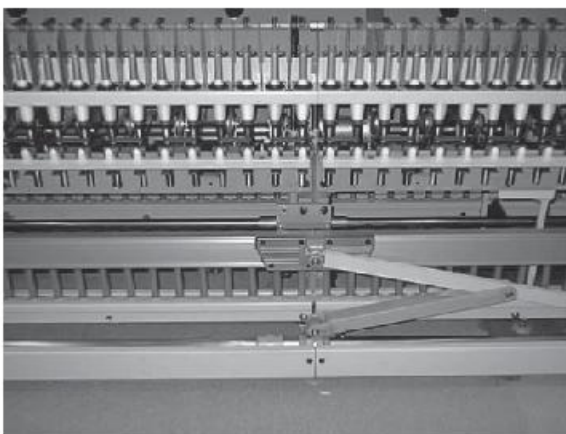
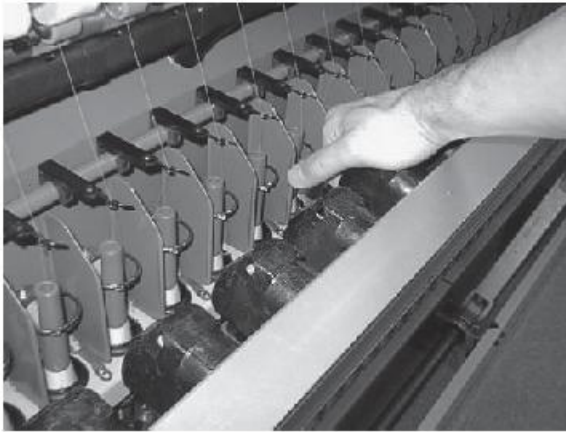
[Tray conveyer]

- Remove yarns entangled around the tray conveyer and empty-bobbins.

(2) Daily inspection and maintenance

For operating the SCD in full performance, it is essential to inspect the SCD daily and maintain it.

Have the operator carry out the daily inspection and inform the maintenance personnel of a problem if found.



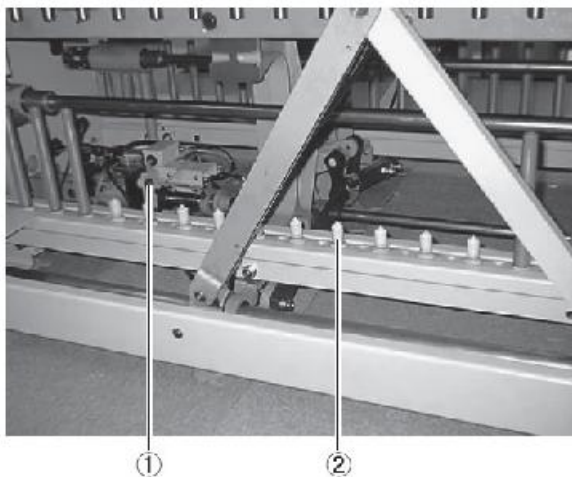
- Grippers
(Replace grippers if broken. Check that the gripper caps are set correctly and replace caps if deformed or broken.)
- Intermediate pegs
(Check that the pegs are not abnormally tilted. Replace pegs if damaged or broken.)
- Doffing operation
(Check that the bobbins are correctly gripped. Check that full-bobbins on the same spindles or many full-bobbins are not undoffed.)
- Tray transfer operation
(Check that the tray stop position is correct.)
- Bobbins
(If the SCD fails to load bobbins onto the spindles or pegs, check those bobbins for deformation or damage. Put the deformed or damaged bobbins in the defective bobbin box and repair or dispose of them.)

NOTE: When loading or unloading bobbins, be sure to completely stop the spindles if in rotation by using the knee brake. Otherwise, the inside of the bobbins will be scratched, resulting in frequent bobbin loading failures or undoffed full-bobbins.

[2.4] Periodical Cleaning

It is recommended that you make a note of the periodical cleaning carried out, on Subsection MB [2.7] “Periodical Check Sheet”.

(1) At intervals of 3 months

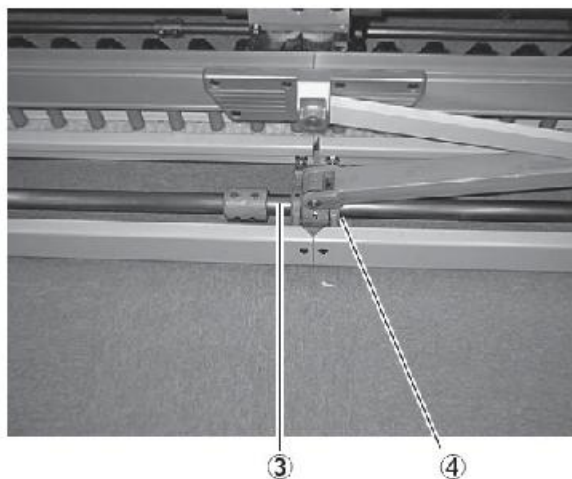


■ Tilting part

Tools:

- Hand picker
- Brush
- Vacuum cleaner

- ① Clear fly or fleece from the OE tilting cylinder and its surrounding.
- ② Clear fly or fleece from the tilting lever bracket and its surrounding.

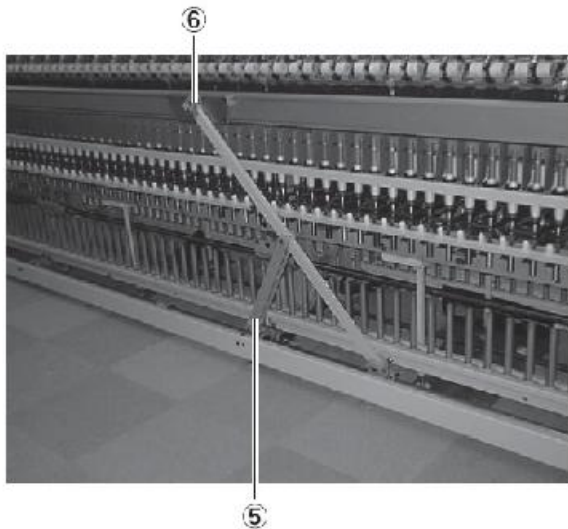


■ Main shaft

Tools:

- Hand picker
- Brush

- ③ Remove fibers accumulating on the main shaft.
- ④ Clear fibers from the main shaft bracket and the inside of the sleeves.



■ Lifter arm part

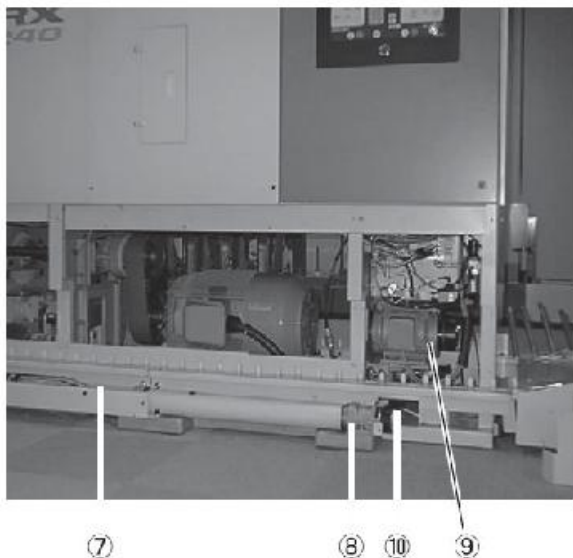
Tools:

- Hand picker
- Brush

Move up the doffing bar and then start cleaning.

NOTE: Be sure to check that nobody is in the interframe passages before operating the doffing bar.

- ⑤ Clean the lifter arm and its surroundings.
- ⑥ Clean the doffing bar and the grippers.

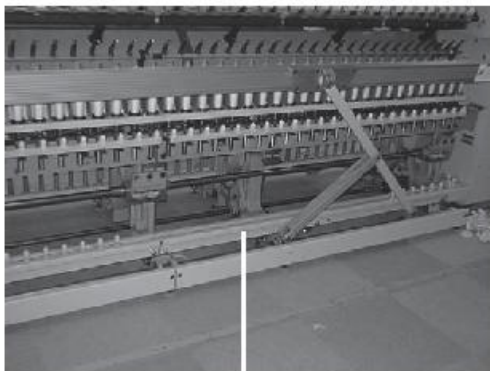


■ Drive part

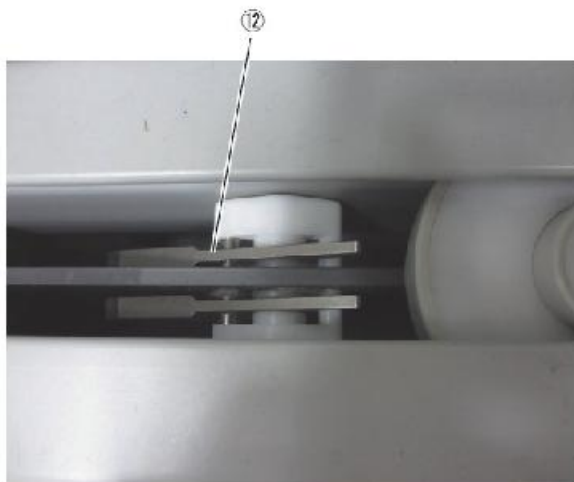
Tools:

- Hand picker
- Brush
- Vacuum cleaner

- ⑦ Take off the power cylinder cover and remove fibers entangled around the cylinder rod.
- ⑧ Take off the timing pulley cover and remove fibers entangled around the pulley.
- ⑨ Take off the side cover, and then remove fly or fleece from the gear box and motor surrounding and remove fibers entangled around the encoder shaft.
- ⑩ Remove fibers accumulating on the timing belt.



⑪



⑬

■ Tray conveyer and its related sections

Tools:

- Hand picker
- Take-up rod
- Waste cloth

⑪ Remove fibers from the inside of the tray rail in the following manner:
First, take out 10 to 20 trays from the outlet and then clear fly, fleece, or yarn dust from that notray area. Then, move 10 to 20 trays to that cleaned area and clean a new no-tray area. Repeat this to clean the full tray rail.

⑫ Clear fly, fleece, or yarn dust from the tray feed blade and parts around the blade carefully. Clean all the positions in turn.

※If you continue operation with fly or fleece on the feed blade, the blade may get broken, causing tray feeding failure.

■ Inside the bobbins

Tools:

- Brush
- Waste cloth
- Silicone spray or automatic bobbin cleaner (dedicated machine)

⑬ Clean the sleeves inside the bobbins, and then apply a small amount of silicone to the sleeves.

[2.5] Periodical Maintenance

Just as for the periodical cleaning, it is recommended that you make a note of the periodical maintenance carried out, on Subsection MB [2.7] “Periodical Check Sheet”.

(1) At intervals of 6 months

According to Subsection MB [2.7] “Periodical Check Sheet”, carry out the periodical inspection at the same time as the periodical cleaning.

■ Checking points

- Check parts and components for damage or deformation.
- Check that the parts and components are installed into place so as to work correctly.
- Check each slideway for wear.
- Check that each air device works normally without air leak.
- Check that each section is adjusted so that it functions in the proper speed. (Check the doffing bar open/close speed or tray rail speed.)
- Check that the safety switches operate normally.
- Check that the tray stoppers are not deformed or worn abnormally and that they operate smoothly.
- Check that the tray rail bearings are not entangled with fly or fleece and that they rotate smoothly.

The service life of those bearings is approximately 2 years. However, it differs depending upon the spinning environment and periodical cleaning in practice, so replace them as needed.

[2.6] Special Maintenance

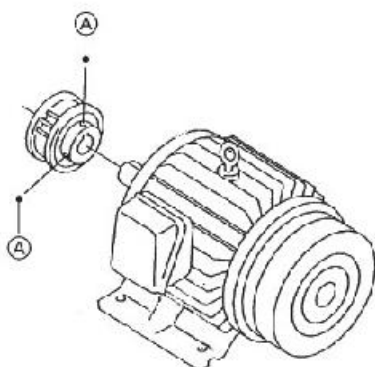
(1) Every year

In addition to the periodical maintenance, you should perform special maintenance every year. Check the SCD according to Subsection MB [2.7] “Periodical Check Sheet”, then adjust or replace faulty sections if any, while keeping the amount of disassembly down to a minimum.



■ Special maintenance locations

- (1) Doffing motor
 - Clean and inspect it.
- (2) Brake
 - Clean and inspect it. Check for abnormal wear.
- (3) Inside the peg tray rail
 - Remove the tray cover if necessary, and then inspect and clean the inside of the peg tray rail. Check for abnormal wear. Check the stopper function. Check that the bearings rotate smoothly.
- (4) All of the tightening bolts
 - Tighten them further.
- (5) Setscrews (A) on the doffing motor pulley
 - Torque them to 4.9 N·m (50 kgf·cm)



[2.7] Periodical Check Sheet

SCD Periodical Check Sheet

(1/3)

OK	✓	Adjust	A	Tighten	T	Cleaning	C	SCD No.		Period from		to	
Defective	x	Repair	△	Replace	R	Lubricate	L						
Location	Check items			Check for			At intervals of 3 months	At intervals of 6 months	At intervals of 9 months	Yearly	Check method	Remarks	
SCD drivers	1. Drive gear box	- Lubricated state - Abnormal noise, heat, and vibration										Grease pump	
	2. Motor	Abnormal noise, heat, and vibration										Tactile check	
	3. Brake	- Gap - Abnormal wear										Thickness gauge	0.3 to 0.7 mm
	4. Timing belt	- Tension - Damage such as lack of teeth - Belt travel condition										Tactile check	
	5. Encoder (PG3)	- Entangled fibers - Loose screws at the joint										Visual check	
Pneumatic device	1. Air pressure	Specified pressure										Gauge	
	2. Solenoid valve	Air leak										Tactile check	
	3. Pressure switch (PS)	- Set values - Operation										Visual check	
	4. Regulator	Water collected										Visual check	Drain the collected water with the drain valve.
Lifter unit	Power cylinder	Belt tension										Tactile check	
	1. Timing belt	- Belt travel condition - Damage such as lack of teeth										Visual check	
	2. Screw shaft	Lubricated state										Visual check	
	3. Joint section	Loose or deformed joint pins										Visual check	

(2/3)

OK	✓	Defective	x	Adjust	A	Repair	△	Tighten	T	Replace	R	Cleaning	C	Lubricate	L	Location		Check items	Check for	At intervals of 3 months	At intervals of 6 months	At intervals of 9 months	Yearly	Check method	Remarks	
Lifter unit	Main shaft related	Loose set screws																						Tool		
		1. Sleeves	Positioning deviation																					Visual check		
			Inside clogged with fibers																					Visual check		
		2. Couplings	Loose or deformed pins																					Visual check		
		3. Safety sensors	Detection state in the stop position																						Visual check	
	- PRS21 - PRS22																					Ruler	1 mm to 2 mm			
	Opening/closing unit	Tilting-related																								
		1. Tilting cylinder	Loose connections																						Visual check	
			Air leak																					Tactile check		
		2. Stopper cylinder	Smooth movement																						Visual check	
Loose screws																						Tool				
3. Position sensors	Gap between the sensors and detection plates																							Ruler	1 mm to 2 mm	
	Detection state in each position																						Visual check			
	- PRS3 - PRS10 - PRS11 - PRS12																						Visual check			
4. Opening/closing operation	Vibration and abnormal noise																							Visual check	The operation should be completed for 4 to 5 seconds.	
	Gripper unit	Cap installation state																							Visual check	
1. Grippers		Pistons for scratches																						Visual check		
		Air leak																						Tactile check		
2. Parallelism		Gripper height in the PA position																						Gauge		
3. Alignment		Off-alignment from the spindles																						Visual check	Within 2 mm	
4. Undocked bobbin sensors	Optical axes of photosensors																							Bobbin		
	- PH70R - PH70L																						Visual check			

OK	✓	Defective	×	Adjust	A	Repair	△	Tighten	T	Replace	R	Cleaning	C	Lubricate	L
Location	Check items	Check for	At intervals of 3 months	At intervals of 5 months	At intervals of 9 months	Yearly	Check method	Remarks							
Intermediate unit	Intermediate pegs related														
	1. Stop bar	• Warp, bend, and deformation					Visual check								
	2. Pegs	• Tilt, looseness, and deformation					Visual check								
Tray transfer unit	1. Tray cylinder	• Operation speed • Air leak • Loose bolts					Visual check Tactile check Visual check	The operation should be completed for 1.5 seconds.							
	2. Cylinder position sensors • PRS48A • PRS48A • PRS48B • PRS48B	• Detection state • Scratches or damage					Visual check Visual check								
	3. Tray rail	• Tray stop positions • Fibers collected • Abnormal wear					Visual check Visual check Visual check								
	4. Tray cover	• Bend and unevenness at the joints • Inside clogged with fibers					Visual check Visual check								
	5. Tray entrance stopper	• Operation • Deformation and abnormal wear					Visual check Visual check								
	6. Tray position sensors • PRS60A • PRS60A • PRS60N • PRS60N	• Detection state • Scratches or damage					Visual check Visual check								
	7. Trays	• Deformation, scratches, and levelness					Visual check								
	8. Tray stoppers	• Operation • Deformation and abnormal wear					Visual check								
	9. Tray stopper bearings	• Rotation					Tactile check								
Instrumentation	1. Wiring	• Scratches and abnormal slack					Visual check								
	Checked on _____ (date)														
	Checked by _____														

[3] Repair and Adjustment

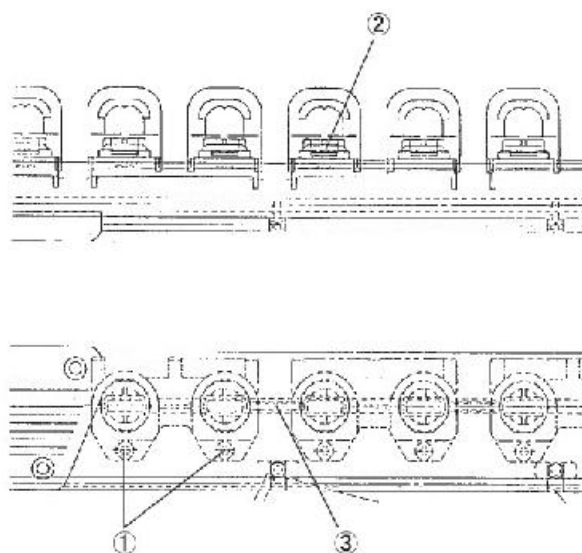
[3.1] Precautions for Troubleshooting and Fixing



⚠ WARNING

- (1) If the SCD operates abnormally or it comes to an abnormal stop, you should isolate the problem and fix it as soon as possible.
- (2) Before taking necessary recovery actions, find whatever caused the problem and remove it to prevent it from recurring.
- (3) Whenever troubleshooting and taking recovery actions, power off the SCD and RX and put up the warning notice (tag) for safety.
- (4) When making repairs or adjustments that require you to get under the doffing bar, always power off the SCD and RX and then set the stoppers (R8267-01010-00) onto the main shaft, at two or more locations per shaft end, as well as making a safety check.
- (5) The SCD displays error messages at the time of error occurrence, making it easy to take quick and correct actions. Refer to Chapter 8B. "TROUBLESHOOTING".

[3.2] Checking and Replacing the Gripper Components



- (1) Move the doffing bar up to the top opening/closing position (PJ) manually.
- (2) Loosen the two screws ① on the defective gripper and remove it. For making the subsequent job easier, remove the adjacent grippers also.
- (3) Disassemble the defective gripper and check the components for recycling non-damaged components.

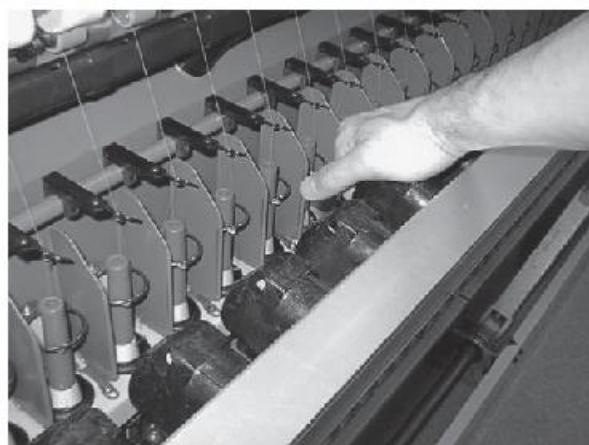
1. Pistons ②

- Check that each of the pistons is not cracked or deformed.
- Check that each of the tops is not scratched or damaged.

2. Check each of the diaphragms is not broken. Replace the defective components.

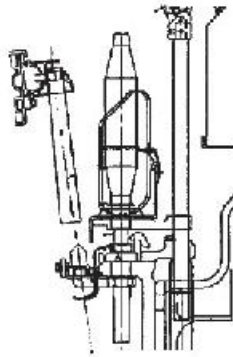
- (4) Assemble the gripper components according to the steps below.

1. Put two springs into each piston, then integrate those pistons into the gripper housing.
2. Install the diaphragms.
3. Set O-rings on each of the right and left ends of the end plate.
4. Install the end plate onto the gripper housing. Then, insert one end of the nylon tube ③ while pressing the end plate with your fingers.
5. Connect the gripper with the adjacent grippers removed in step (2).

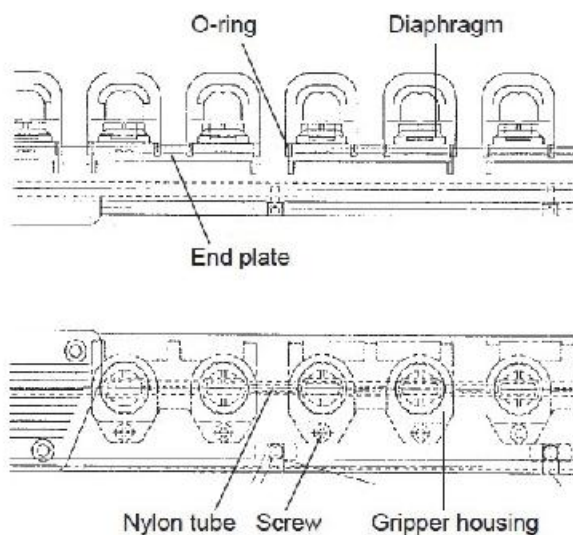


- (5) Reinstall the grippers onto the doffing bar according to the steps below.
 1. Insert the other end of the nylon tube to the adjacent gripper. Also at the opposite side of the end plate, insert the other nylon tube to the another adjacent gripper. When inserting the nylon tubes, take care not to bend them.
 2. Tighten two screws uniformly.
- (6) Install the gripper cap.
- (7) Check the gripper for air leakage and then return the doffing bar to the storage position (PD).

[3.3] Checking and Repairing the Grippers for Air Leakage



- (1) Move the doffing bar to the middle bobbin holding position (PF) by manual operation.
- (2) Activate the gripper by manual operation to check for air leakage in the following manner:
 1. Approach the grippers and listen for the sounds of air leaking.
 2. Surround each gripper with both hands to feel for air leaks.



- (3) If air is leaking from the connection,
 - Both ends of the vinyl tube are deformed,
 - The vinyl tube is not inserted into the O-ring correctly,
 - The O-ring (s) is crushed, or
 - The O-ring (s) is scratched.

If air is leaking from other sections,

- The two gripper screws are not tightened,
 - The diaphragm (s) is damaged,
 - The end plate is damaged, or
 - The gripper housing is damaged.
- (4) Check, repair, or replace the defective sections, referring to Subsection MB.3.2.
 - (5) Move the doffing bar to the PF position and release the grippers manually, and return the doffing bar to the PD position.

[3.4] Replacing the Broken Timing Belt

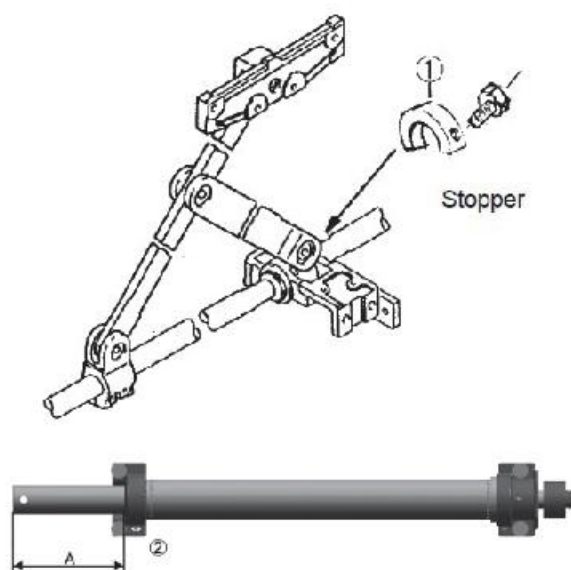
⚠ CAUTION

If the timing belt is broken, press the Emergency stop button or Stop switch to stop the SCD as soon as possible.



⚠ CAUTION

When installing the stoppers, never let hands or a part of your body get inside the doffing bar or the lifter arm.

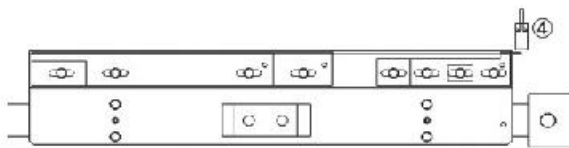


- (1) Fit two stoppers ① (R8267-01010-00) on the main shaft whose timing belt is broken, in order to prevent the doffing bar from lowering further.
- (2) According to the following procedure, adjust the power cylinder whose timing belt is not broken so that its distance “A” becomes equal to that of the power cylinder ② whose timing belt is broken.

1) Ordinary mode



1. If neither the error code “E-69B” or “E-69C” is displayed, move the doffing bar up or down in the ordinary mode by manual operation.



2. If the error code “E-69A” or “E-69C” is displayed, operate from the Initial Setting - Adjustment screen. (See Subsection 6B [2.4] for the initial Setting - Adjustment screen).

3. If the error code “E-52A” is displayed, turn on the safety sensor PRS21 ④ (which stays OFF) by applying an iron piece to the detection side of the sensor. Make sure that the indicator on the sensor comes on.

REFERENCE: If the safety sensor is OFF, the doffing bar cannot move.

- (3) Make sure that disengaging the doffing bar causes no trouble at both the right and left sides. Then, switch off the solenoid valve by hand according to the following steps:

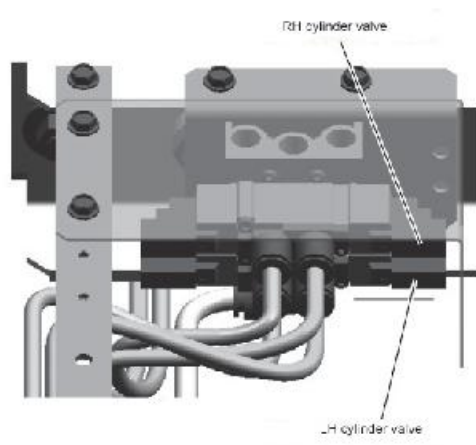
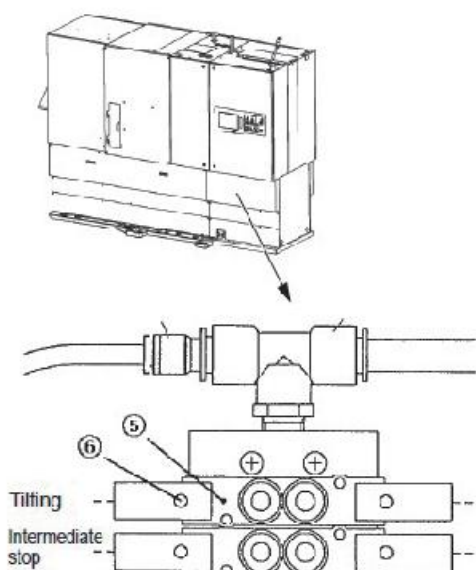


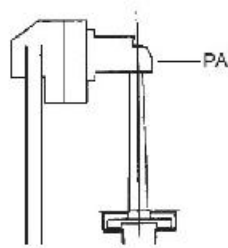
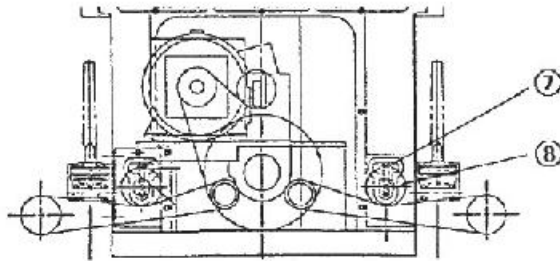
1. Turn off the main circuit breaker of the SCD.

⚠ CAUTION

After turning off the main circuit breaker, be sure to put up the warning notice on it.

2. Open the RH side cover.
3. Push selector valve ⑥ of solenoid valve ⑤ by hand, and the doffing bar will be disengaged.



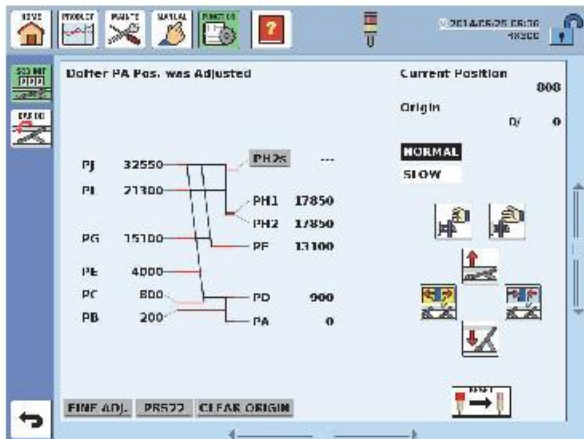


- (4) After confirming that distances “A” on the right and left power cylinders ② are equal, install a new timing belt according to the steps below.

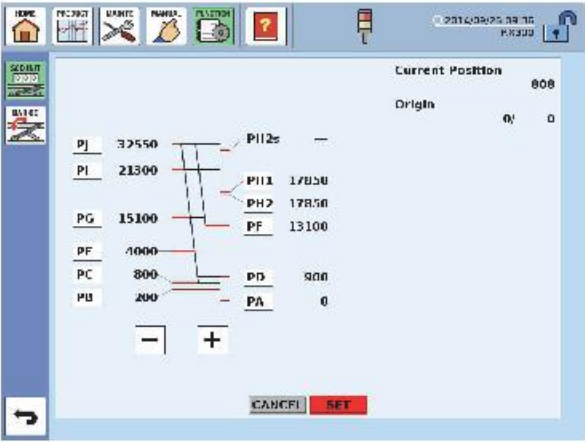
1. Put the timing belt on the timing pulley.
2. Install tension pulley ⑧ and turn adjustment bolt ⑦ to tighten the belt. For the timing belt tension setting, see Section 3B [2.5].

- (5) Turn on the main circuit breaker of the SCD and move the doffing bar to the PA position.
- (6) Adjust the doffing bar so that the height of the right and left ends becomes same.

REFERENCE: Move the end of the doffing bar at the side where the new timing belt is installed, based on that at the side where the timing belt was not broken.



- (7) To make the controller recognize the reference position, perform the following procedure:
Set the PA position by referring to Subsection 6B [2.4]
- (8) Check that the doffing bar is correctly centered in the right/left direction and in the forward/backward direction. (Refer to Chapter 4B., Subsections 4B [5.2] . and 4B.[5.3].)
- (9) Make the fine adjustment of the doffing bar. (Refer to Chapter 4B., Subsection 4B [8.5].)
- (10) Check the safety sensor settings. (Refer to Chapter 4B., Subsection 4B[8.7].)
- (11) Before proceeding to the practical production running, be sure to test the manual and automatic operations two or three times each.



GB. TOOLS AND GAUGES

[1] Guide for Tools & Gauges List

The tools and gauges required for the SCD installation and maintenance work are classified as shown in the table below.

Tools & Gauges Classification Table

Classification			Specifications and Remarks
Class		Variation	
D	1 (For SCD and TBC)	—	For SCD and TBC

In the tools & gauges lists given below, the quantity column is divided into three ("1-2," "3-20," and "21-") according to the number of installed.

[2] Tools & Gauges List

In the tools & gauges lists given below, the class of use shows the degree of necessity.

A : Required for both installation And maintenance

I : Required for Installation only

M : Required for Maintenance only

E : Those tools and gauges are Essential to the maintenance work.

R : It is Recommended that those tools and gauges be ready for use in the maintenance work.

C : Those tools and gauges are Convenient if they are ready.

[2.1] Class D: Tools & Gauges for SCD and TBC

■ D-1. For SCD and TBC

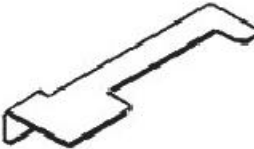
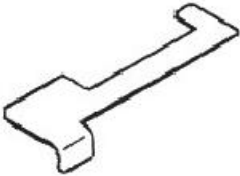
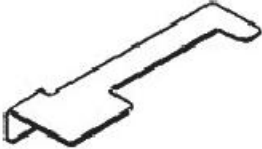
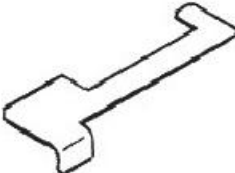
No.	Parts Number	Name	Quantity			Class of use	Specifications	Degree of Necessity
			1-2	3-20	21-			
1	R8223-01010-0*	GAUGE, CRANK LEVER LEVELING	1	1	1	I		E
5	R8267-11020-0*	STOPPER, LIFTER ARM	2	2	2	A		E
6	R8221-01010-0*	GAUGE, TILTING BRACKET POSITIONING	1	1	1	I		E
7	R8277-05010-0*	GAUGE-ASSY, PRESSURE	1	1	1	A		E
9-1	R8283-01010-0*	TOOL, PEG TRAY RAIL POSITIONING 75G (CW)	1	2	2	A	75G, CW	E
9-2	R8283-01020-0*	TOOL, PEG TRAY RAIL POSITIONING 75G (CCW)	1	2	2	A	75G, CCW	E
9-3	R8283-01030-0*	TOOL, PEG TRAY RAIL POSITIONING 70G (CW)	1	2	2	A	70G, CW	E
9-4	R8283-01040-0*	TOOL, PEG TRAY RAIL POSITIONING 70G (CCW)	1	2	2	A	70G, CCW	E
11-1	R8284-01010-0*	GAUGE-ASSY, TRAY TURN 75G	2	2	2	I	75G	E
11-2	R8284-01020-0*	GAUGE-ASSY, TRAY TURN 70G	2	2	2	I	70G	E
12	R8284-11010-0*	GAUGE, DISTANCE TRAY COVER	4	4	4	A		E
13	77101-24003	SPANNER, DOUBLE END	2	2	2	I	24 × 32	E

[3] Illustrations of Tools and Gauges

■ Guide for the illustrations

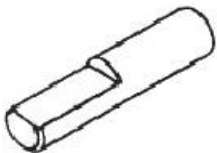
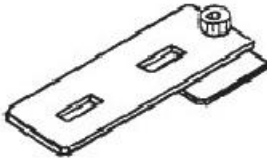
Parts code		E : Those tools and gauges are <u>E</u> ssential to the maintenance work.
Parts name		R : It is <u>R</u> ecommended that those tools and gauges be ready for use in the maintenance work.
Illustration		C : Those tools and gauges are <u>C</u> onvenient if they are ready.
Specifications and models		

[3.1] For Installation and Maintenance

R8267-11020-0*	E	R8277-05010-0*	E		E		E
STOPPER, LIFTER ARM		GAUGE-ASSY, PRESSURE		TOOL, PEG TRAY RAIL POSITIONING 75 (CW)		TOOL, PEG TRAY RAIL POSITIONING 75 (CCW)	
				 75G, CW		 75G, CCW	
R8283-01030-0*	E	R8283-01040-0*	E	R8284-11010-0*	E		
TOOL, PEG TRAY RAIL POSITIONING 70 (CW)		TOOL, PEG TRAY RAIL POSITIONING 70 (CCW)		GAUGE, DISTANCE TRAY COVER			
 70G, CW		 70G, CCW					

[3.2] For Installation Only

An asterisk (*) in parts numbers refers to a numeral which differs depending upon the specifications.

R8223-01010-0*	E	R8221-01010-0*	E	R8284-01***-0*	E	77101-24003	
GAUGE, CRANK LEVER LEVELING		GAUGE, TILTING BRACKET POSITIONING		GAUGE-ASSY, TRAY TURN		SPANNER, DOUBLE END	
							
						24 × 32	

